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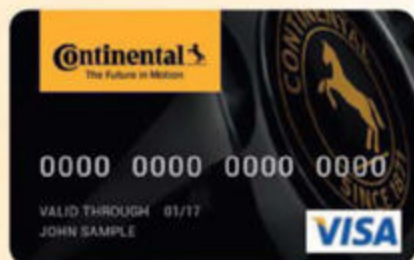






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# One Man's Treasure...

During my weekly phone call with my parents, I mentioned to my dad that if I could have one of my previous cars back, it would be my '92 MK2 GTI. My wife, standing in the kitchen, nearly dropped an entire tub of I Assume They're Healthy Because They're From Trader Joe's cookies. She was shocked because shortly before I took this position, I had sold my '81 Porsche 911SC Coupe, affectionately known as Otto. Yes, I sold a 911 that would have made the perfect project for this magazine right before I took the job. I'm the guy who walks away from a slot machine one pull away from the mega-millions because I wanted to make sure I had those last three quarters for the Milky Way I had my eye on in the vending machine.

But this column isn't about my impeccable gift of timing. I'll save that one for the day before something really important is happening. This column is about me justifying why I'd pick a wrong-wheel-drive, 120hp on its best day, guaranteed

"I did almost all the work myself, the only way I could afford to own such a car."

to never be collectible hot hatch over one of the best sports cars the world has ever seen. Sometimes I think my sense of timing is only matched by my good judgment.

I loved both cars dearly. I bought my 911 while I was in college, and it was my daily driver during all seven years of my four-year degree. I did almost all the work myself, the only way I could afford to own such a car.

My dad had the GTI at that point. He bought the GTI new off the lot while I was still in high school. I eventually bought the GTI from Dad when I moved to California. It was my daily driver for a year and a half and was a complete joy and trouble free. It then transitioned to a "project car," and as I amassed piles of performance parts inside my tiny apartment, the car spent most of its time sitting on the curb. My wife and I worked in adjacent buildings, so we drove her more modern and by comparison luxurious New Beetle 1.8t everywhere. I eventually made the decision that I would be better off selling the car, as I didn't have a place to work on it. The guy who bought the car got a good deal on a trunk full of GTI parts that included a free car to carry them home in.

Now that I think about it, I sold my GTI not too long before starting at *European Car* the first time. Another winning decision.

In truth, I would like both cars back. The ideal situation was when I had the GTI as a daily driver and the 911 as the weekend toy. Right now, I have *ec's* long-term MK7 GTI, so you might think this would be a great situation to again own the 911, and admittedly, that would be the smart decision. However, when I really think about it, if I could walk out and get into either car, right now, just to drive, I still want the little VW.

The 911 is the better driver's car in every way, especially my old car. I had rebuilt the engine with lighter higher-compression pistons, ported and polished heads, mild cams, race exhaust, lightened flywheel, and I won't even go into the suspension or brake mods. The manual steering rack communicated better than any other car I've ever driven. The throttle response was telepathic and the brake pedal feel and travel were perfect.

The GTI also had amazing steering. Hydraulically assisted steering, with no torque steer, no variable ratio rack, 14-inch wheels, and yet it was better than 99 percent of all modern cars. The brakes were, well, adequate. It had a Neuspeed cam, drilled-out airbox, Techtonics exhaust, and still always felt just slightly underpowered. The seats were good—not the Recaros like the ones in the 16 valves—but still good. What it did do, however, was always put a smile on my face.

If I had the 911 again, I'd obsess over the restoration and the selection of parts. Once it was done, I'd be too scared to drive it. Every time I looked at it, all I'd see was my son's college fund on wheels. It would undoubtedly appreciate every year I owned it, but that's not why anyone should want to own a car.

I want a car I can drive. I also want a car I can park at the grocery store or movie theater without worrying if I'm affecting the value. I want a car that can be driven hard without risk of jail or fiery regret. I want a car that I feel needs me as much as I need it. It isn't about the ultimate performance, but just being able to get in a car and drive without having to think about anything else. Maybe I'm looking for that time in my life again as much as I am the car. Or maybe I need to start searching the classifieds for another MK2.

Michael Febbo, Editor  
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## SPEC BILLET LIGHTWEIGHT FLYWHEEL

Yes, there's a company called Spec and it makes a single-mass flywheel from billet aluminum that fits the R55 Mini Clubman, R56 Cooper S, and R57 Convertible. It weighs 12.8 pounds, meaning a 54 percent reduction in mass from the factory unit for greater throttle response, and it's rebuildable. Works well with a Spec clutch, but also plays nice with the OE version. **\$529.** [specclutch.com](http://specclutch.com)



## BLACK FOREST INDUSTRIES SHIFT KNOB

BFI says it has shift knobs that will fit virtually any car, but it also has adapters that are compatible with VW/Audi, BMW, and Porsche models. The company says the one covered in perforated leather "feels like butter in the palm of your hand." We sincerely hope not, since that would be greasy and smelly. But we get the general gist: They're nice. **From \$99.** [blackforestindustries.com](http://blackforestindustries.com)



## VORSTEINER VERONA EDIZIONE REAR WING

Having forked out \$240,000 or thereabouts for a '15 Huracan, the well-dressed Lambo driver must absolutely augment his or her new wheels with this new ultra-rigid, two-piece, carbon-fiber rear wing from Vorsteiner. The uprights are fashioned from T6061 aluminum and can be painted to match the car. **\$3,995.** [vorsteiner.com](http://vorsteiner.com)

## COMMON FIBERS CARBON-FIBER WALLET

Of course, we all need a carbon-fiber wallet. Those heavy leather things holding our cash are slowing us down. Common Fibers makes two sizes that are fairly self-explanatory: Max and Slim. Apparently, even the Max folds to half the size of a regular wallet, despite six credit card slots and two hidden pockets. And that's not all; these things can even block radio frequency identification (RFID) fields to protect against identity theft. Oh, and they're 100 percent vegan, but don't eat them. **From \$60.**

[commonfibers.com](http://commonfibers.com)



## TAROX BESPOKE BRAKE UPGRADE

When the time comes to replace the front discs on one's 991-series Porsche 911 Carrera S, it might be a good idea to think about these two-piece, spiral-grooved babies from Italian company Tarox. Although the factory disc is one piece, this upgrade retains the same dimensions (340 mm x 34 mm) to be compatible with the rest of the system. Each disc is also around 2 pounds lighter due to a billet steel and anodized alloy hub construction. **Approximately \$1,500 per pair.**

[tarox.co.uk](http://tarox.co.uk)

## M7 SPEED STRUT TOWER BRACE

Mushrooms aren't always tasty, especially concerning R53 and R54 Mini Cooper S strut towers. Some owners have noticed that these parts will buckle under repeated punishment from the shock absorbers—a problem exacerbated by low-profile tires. The result is a suspension whose alignment can never be fully straight. M7's strut tower brace has endplates that are half an inch thick, enough to prevent mushrooming and improve handling into the bargain. It's machined from billet aluminum and finished in an anti-chip, anti-corrosion matte black powdercoat. Installation can take as little as 20 minutes, and there's sufficient clearance for stock or aftermarket air intakes. **\$229.** [m7tuning.com](http://m7tuning.com)



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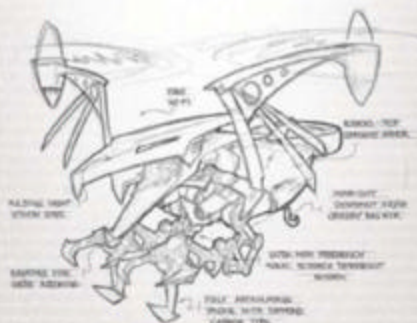
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[impeccausa.com](http://impeccausa.com)



### MAGNAFLOW EXHAUST SYSTEM

It's about time someone made something nice for the excellent Volkswagen Jetta SportWagen 2.0 TDI. This cat-back exhaust system is made from mandrel-bent, 2.5-inch, stainless steel tubing. Not only does Magnaflow claim a "smooth, deep tone" but also gains in horsepower and torque along with improved fuel efficiency, although the company hasn't released any numbers yet. **\$710.66.** [magnaflow.com](http://magnaflow.com)

### B-G RACING EZ SWEEP CASTOR SLIP PLATES

We've seen other castor slip plates with 15 degrees of rotation, but this set goes up to 20 degrees. They're incredibly thin, have a stainless steel base, and are coated with a PTFE surface (aka Teflon) that allows wheels to move smoothly through the measuring arc. Just provide a flat floor, and drive onto the plates to check castor, camber, and kingpin inclination angles. **200 GB pounds for a pair, (around \$300).** [bg-racing.co.uk](http://bg-racing.co.uk)



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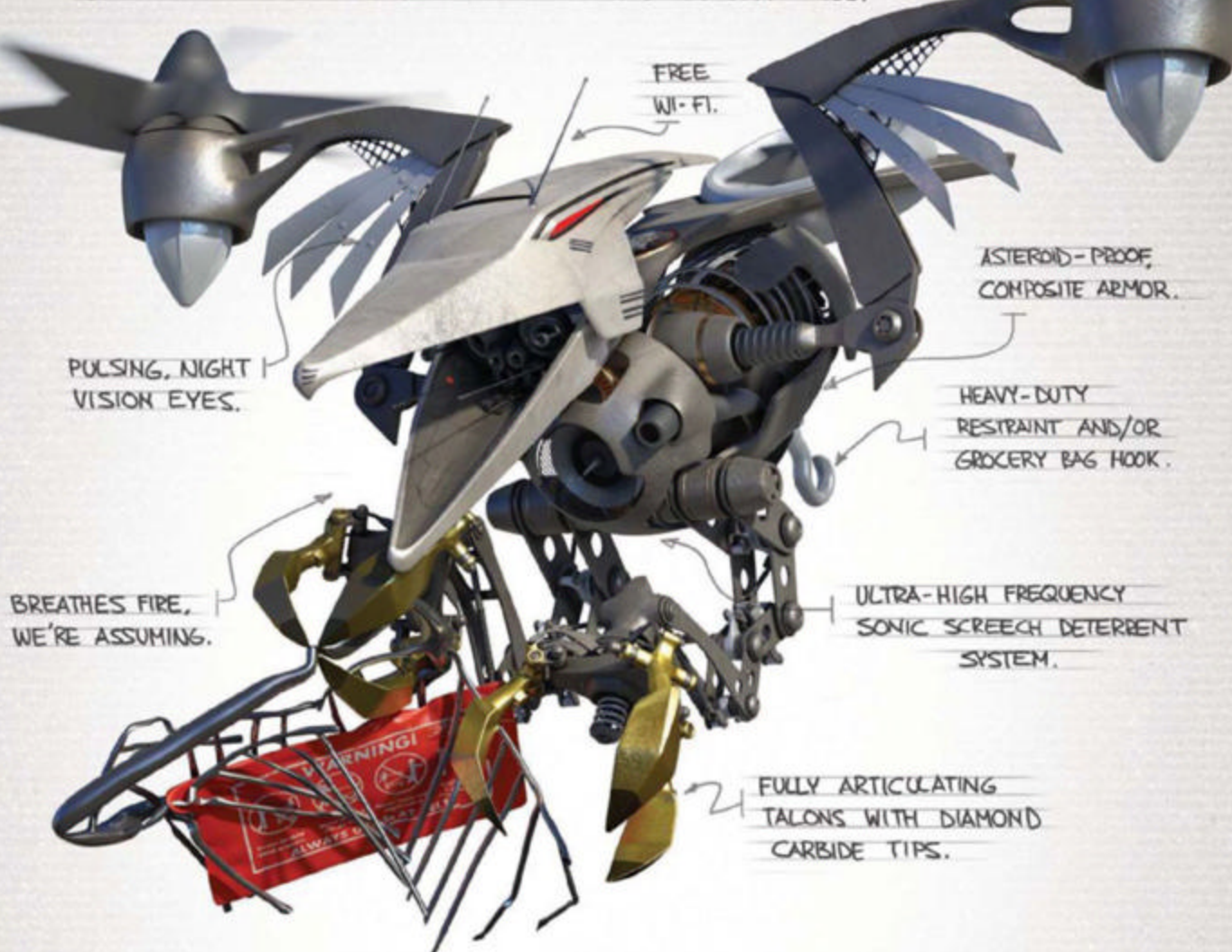
Admittedly, it's a bit of stretch, but they could be made to fit something other than the '11-on VW Caddy this stuff was originally designed for. The Caddy is a compact commercial vehicle in other corners of the world. It's based on the fifth-generation Golf platform, and we all know how interchangeable some of those parts are. The stainless steel mesh lower grille comes from U.K. company Zunsport, and the lamps (LED, despite the brand name) are available separately. **The whole caboodle costs approximately \$370.** [lazerlamps.com](http://lazerlamps.com)





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## V-MAXX PERFORMANCE SPRINGS

V-Maxx has a number of spring kits for the Audi A5 ('07-on B8) with progressive spring rates that keep the comfort at low speeds and bring greater composure when corners are attacked rather than negotiated. Ride height is lowered between 1.0 and 1.4 inches, depending on which kit is chosen. All springs are made of chrome silicone steel, then shot-peened, zinc-phosphated, and powdercoated. **From around \$265.** The U.S. website wasn't working when we clicked on it, so try [v-maxx.com](http://v-maxx.com) or the company's Facebook page.



## DINAN FREE FLOW EXHAUST SYSTEM

Few companies know their way around a BMW like Dinan. The new Free Flow exhaust for the '15 M3/M4 is a direct bolt-on replacement, saving 3 pounds over the factory unit and bringing a claimed 5 hp thanks to better breathing. It's made from 16-gauge 304 stainless steel and comes with polished stainless steel or ceramic black tips. Twin secondary valves are 3 inches in diameter and 45 percent less restrictive than stock. Low volume in Econo mode, full-on blast in Sport and Sport+ modes. **\$2,499.** [dinancars.com](http://dinancars.com)



## AIR FORCE MASTER BLASTER CAR DRYER

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[calcarcover.com](http://calcarcover.com)



## EIBACH PRO-SPACERS

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## AWE TUNING S-FLO CARBON INTAKE

"A surefire way to unlock 10 hp and 9 lb-ft of torque from the athletic little S3," says AWE about its new carbon-fiber intake. These figures would be measured at the Audi's crank, by the way. As usual with AWE, this component is designed, engineered, and tested in-house; a perfect fit is guaranteed; and so is an unlabeled "check engine" alert. **\$599.95.** [awe-tuning.com](http://awe-tuning.com)



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# Mercedes-Benz F 015 Autonomous Concept

## SPACE—THE FINAL FRONTIER

Words Ian Kuah

In Luc Besson's spectacular sci-fi movie *The Fifth Element*, set in 2263, Bruce Willis' character, Korben Dallas, is a New York City cab driver in a world where autonomous flying cars are everyday transport. *The Fifth Element* was released in 1997, and 18 years on, we are still a very long way from such a scenario. But have no doubt that the motor industry has already taken its first tentative steps toward autonomous driving cars.

The idea of an autonomous driving vehicle is not a new one, but most people are surprised when they learn that the concept was originally mooted in the early days of the motor car by Nikola Tesla (1856-1943), the Serbian American inventor who was one of the fathers of electricity. However, as with many advanced systems, autonomous driving required several enabling technologies to be invented and developed to a certain level before it could even reach the relatively early stage it is at now.

This is all a matter of processor power and programming, and at this early stage of the game the system performs pretty rudimentary tasks without the higher level of cognitive self-awareness and adaptation that will come in time as the technology matures. Underlining this sequence of events, the autonomous driving technology we experienced on the S500 Intelligent Drive test in Silicon Valley in November of 2014 did not just come out of nowhere. Rather, it is the next logical step based on the building blocks of systems that already exist. Today's radar sensors and cameras are just the latest additions in an additive process that began with the basic cruise control function Mercedes has offered since the 1980s.

The systems progressed in stages through Distronic, Distronic Plus, and Distronic Plus with Steering Assist, all the time becoming more intelligent, interactive, and semi-autonomous. Tracing this technological timeline, you can see that autonomous driving was the logical end game all along. However, as with all such inventions, autonomous driving had

to wait for the right enabling technologies; in this case, the computer processing power to handle the inputs from various sensors and cameras and control the vehicle autonomously.

It is a fact that even 20 years ago, the ECUs in cars already had more computing power than the roomful of computers that sent man to the moon in the 1960s. But a true autonomous driving car will require a huge amount of computing power and vehicle intelligence.

According to Rob Csonger, vice-president and general manager of Nvidia's automotive division, "The car is rapidly going to go from the most 'stupid' electronic device a consumer owns to the most powerful supercomputer a consumer will ever own."

"The ability for a car to detect, understand, and react in the blink of an eye will require a staggering amount of processing power as automakers add ever more sensors for driving assistance, infotainment, and navigation," he explained.

However, the biggest obstacle to adoption of autonomous driving technology is worldwide legislation. While California has already passed laws that allow such technology on its roads, there is still a long way to go elsewhere. The issue of liability alone in case of an accident is a veritable minefield. The SAE (Society of Automotive Engineers) has established a set of internationally accepted standards for autonomous driving vehicles. The S-Class prototype represents Level 2, while a completely autonomous driven Level 4 car will be able to receive destination instructions from its occupants and take them there all by itself. A Level 4 car retains a manual-over-ride capability so a human driver can take over. Level 5 uses exactly the same technology but is totally autonomous with no manual over-ride possible.

It is a fact that even 20 years ago, the ECUs in cars already had more computing power than the roomful of computers that sent man to the moon in the 1960s.

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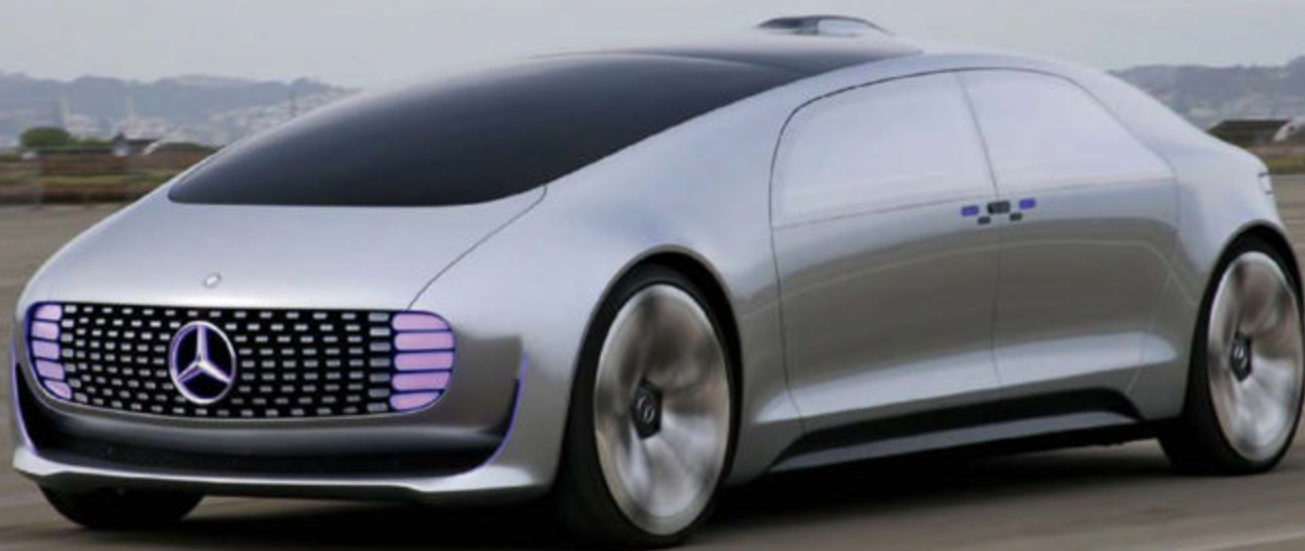
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Space is certainly a luxury, and the F 015 Concept car shows that Mercedes-Benz is not just thinking about the technologies that can be fitted into a vehicle.

The reality is that we will not achieve Level 4/5 for perhaps another 20 years. While the rapidly advancing speed and capability of computers will allow the technology to mature quite rapidly, there are many peripheral issues that make practical implementation a steep uphill battle.

Mercedes is using the term "Modern Luxury" to describe the broad palette of ways in which it is redefining the age-old concept of material and mental well-being. Projected into the future, Modern Luxury includes quality of space and also time freed from the traditional mundane tasks like driving in traffic jams in the city or on the motorway. These can be given to an autonomous driving car, allowing the driver to get on with more productive tasks such as making phone calls, doing work on a laptop or tablet, or even watching a movie.

Some aspects of driving are a chore no matter how much you like cars. Driving along a highway with a low

speed limit for miles on end is one of these uninspiring tasks that can be handed over to a machine that will not lose concentration and crash due to boredom, frustration, or inattention.

When you consider how much of people's lives are wasted in traffic jams, both in terms of lost work productivity and leisure time, the case for autonomous driving makes itself. Ultimately, time is the greatest luxury, and one that money cannot buy. An autonomous driving car gives its driver back a lot of time.

Packaging is the primary conceptual and practical issue for car designers and engineers. But while they always seem able to make small gains here and there with each new model, there is a finite amount of space that can be won in a vehicle of a given size.

Space is certainly a luxury, and the F 015 Concept car shows that Mercedes-Benz is not just thinking about the technologies that can be fitted into a vehicle, but also the ways in which cars can be made more space efficient.

It is always a trade-off between where you place the engine, gearbox, fuel tank, suspension, and other mandatory hardware for best space efficiency and loaded and unloaded weight distribution. Sometimes, the only solution is to challenge convention by changing the rules, which the S-Class-sized F 015 concept rewrites in one fell swoop. With a future electric car removing the needs for an internal combustion engine and fuel tank, the whole space utilization equation changes dramatically with much more space given to passengers to relax.

Because the electric cars we have seen up till now were conceived in the image of existing design stereotypes, they do not even begin to scratch the surface of the re-packaging possibilities opened up by going electric. Taking the decision to unshackle themselves from the expected, the Mercedes design team has broken the mold to make a quantum leap in packaging solutions.



**YOKOHAMA WHEEL**  
ORIGINAL DESIGN

JAPAN MADE



19 20 inch

## AVS MODEL F50

Advanced Vehicle System

YOKOHAMA's mold-form forged wheel history began with the AVS MODEL F7, which came onto the market some years long ago. Since then, however, forged wheels came out under the ADVAN Racing brand, and in the AVS brand lineup, the MODEL F15 followed the F7. We continue to aim for the very best in mold-form forged one-piece wheels. As YOKOHAMA broadened its forged wheel lineup, everyone was awaiting the arrival of AVS brand MODEL T5 design in a forged version. Now the version they were waiting for has finally arrived. The new model is the 4th model change since the original VS5 with its twin 5-spoke design arrived. The name alone, AVS MODEL F50, indicates the new model marks a great leap forward.



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Placing one electric motor in each wheel hub removes the need for a space-consuming engine bay and drivetrain intrusion into the passenger compartment. Meanwhile, the batteries are placed under the central section of the floor, creating the low center of gravity required for good handling and stability.

The F 015 Concept's construction is also revolutionary. Thanks to a structure made from composite materials along with lightweight high-strength steel and alloys, the F 015 Concept weighs up to 40 percent less than a current vehicle of the same size.

We have addressed the time-saving quality of life issues of autonomous driving here before. Today, we are in San Francisco to experience the life-enriching potential of the space freed up by this dramatic re-imagining of the motorcar as we know it.

Stepping into the F 015 is exceptionally easy. The opposed hinged doors on both sides of the car open wide, revealing an unusually spacious and welcoming cabin featuring a wood paneled floor and four seats with ample space around them. Each seat swivels outward to aid ingress and egress. As with the sports seats in an SL, the seatbelts are integrated, and once seated, you can either face another passenger or the direction of your choosing.

As the doors gently hum closed, you find that the predominantly white interior helps to maintain the illusion of a bright and airy space, and without the physical constraints of a center console and fixed seating you do not feel hemmed in. Shades of *2001: A Space Odyssey*.

The F 015 glided along a pre-programmed route on the runway of the former Alameda Naval Air Station, which was closed in 1997, and where some scenes for the movie *The Matrix Reloaded* were filmed. During this unique ride, an engineer showed us how the on-board systems worked. Apart from being able to hand off destination control to each of the four occupants, you can even display movies or your holiday pictures on the screens in the translucent door panels. As the car is Internet connected, you can also display maps and other information on the go.

Freed from the task of driving, you have total freedom to interact with your passengers and continue your activities from home or the office while the car takes you to your destination.

People are very sensitive to their environments, and compared to riding in a conventional car, the sense of light and space in the F 015 makes every journey feel like a liberating experience. It's a brave new world, and one that many would readily embrace. As Howard Hughes famously said, "It's the way of the future!" 🚗

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### Max Performance Summer\*

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### Extreme Performance Summer\*

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In 2014, Hankook Tires won 17 class championships at Tire Rack SCCA Solo Nationals, as well as won the Formula Drift Pro Series Championship.

\*Like all summer tires, the Ventus V12 evo2 and Ventus R-S3 are not intended to be driven in near-freezing temperatures, through snow or on ice.

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# '16 Volvo XC90 T8 PHEV

## THE GOTHENBURG SYNDROME

Words Matt Robinson

**In the premium world, German marques**—Audi, BMW, Mercedes-Benz, and Porsche—pretty much rule the roost. Volvo has always thought of itself as a natural rival to the Germans, but somehow the brand seems to have slipped off the radar of many a car-buyer's consciousness. Now it's time for Volvo to try and muscle back into the Teutonic party and steal some premium sales.

Cometh the hour, cometh the truck. This is the new XC90 SUV, Volvo's latest flagship and a signifier of what the marque is attempting in terms of ramping up the quality range-wide. By 2019, the XC90 will be the oldest car in Volvo dealers, as every other model from Gothenburg will follow its lead in terms of technology.

Which brings us to some of the XC90's tech tricks. It's the first Volvo to sit on the company's new Scalable Product Architecture (SPA) chassis system, a setup that allows enough flexibility in the modular platform to build anything from a compact car to a full-size SUV (like this) on the same underpinnings. Think of it as Volvo's answer to the Volkswagen Group's pervasive MQB.







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Then there are the engines, all four-cylinder Drive-E units of 2.0L capacity, with differing power grades used for various models. It's a risky move on Volvo's part, given that, in spite of the current trend for eco-driven powerplant downsizing, some still consider four-piston engines as insufficiently premium. However, both SPA and Drive-E were developed with electrification in mind, meaning hybrid Volvos are possible without any compromise on interior space or practicality.

This new range-topping XC90 has the T8 Twin Engine. Its gasoline unit is punchy enough, thanks to the use of both a supercharger and a turbocharger—314 hp is not to be sniffed at, certainly not from 1,969 cc. But the T8's Twin Engine nomenclature is bestowed upon it because it has an 81hp electric motor mounted at the back, making this big SUV a plug-in hybrid. It has a 25-mile-plus fully electric range, the benefit of 177 lb-ft of torque available from zero revs, and a Goliath combined figure of 472 lb-ft—all while returning low emissions figures and incredible economy of around 78 mpg (warning: even Volvo officials say this parsimonious figure will be hard to achieve unless you drive electric most of the time).

**"This is easily the best Volvo ever built, almost certainly the class leader."**

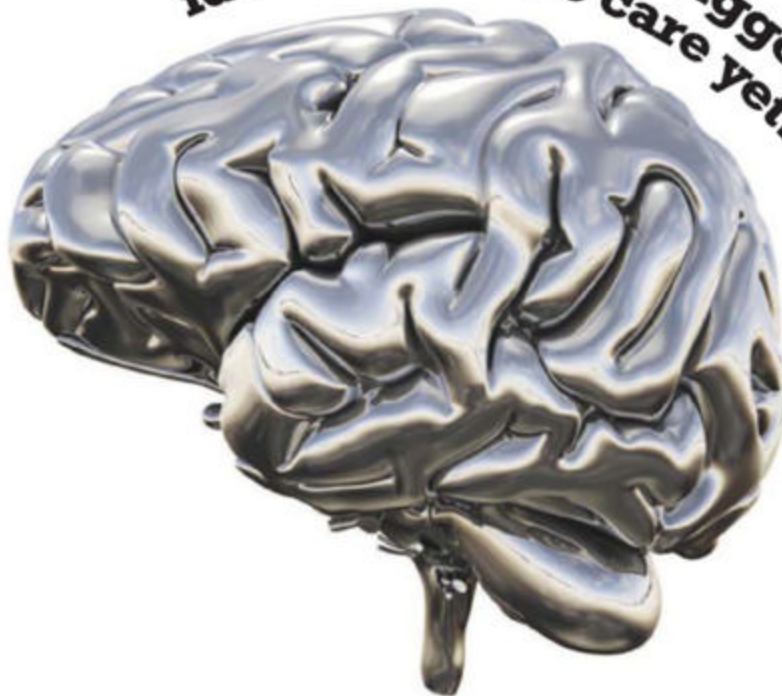
All quite noble, but does the XC90 convince as a credible rival to an Audi, BMW, or Mercedes? Can it even go toe-to-toe with the Porsche Cayenne or possibly (whisper this) a Range Rover?

The answer is a massive "yes." This is easily the best Volvo ever built, almost certainly the class leader, and also an early contender for the title of Finest Car Built in 2015. Beautifully made and superbly resolved in all areas. That it's likely to be around 66 percent of the cost of a Range Rover is phenomenal, because it is every bit as luxurious and cossetting as that Brit icon.

The exterior styling is exquisite, and no XC90 looks bad—whether on standard 19-inch alloys and in entry-level Momentum trim, or running on optional 21-inchers and packing R Design sports styling. The "Thor's hammer" LED daytime running lamps are just one glorious feature of a body that is the epitome of Swedish values: cool, sleek, and sharp.

Its party trick is that it is a physically big vehicle that doesn't look like one. The reason it's so large is because it houses seven seats in a huge, comfortable interior that's a quantum leap from the old car in terms of quality. The design is stunning everywhere, the materials are of the highest standard, and everything feels wonderful to the touch.

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## first drive



### TECH SPEC '15 VOLVO XC90 T8 PHEV

**BASE PRICE**  
\$60,000 (est.)

**LAYOUT**  
Front-engine, AWD,  
seven-seat, four-door SUV

**ENGINE**  
2.0L, 318 hp/295 lb-ft,  
turbocharged and  
supercharged, DOHC,  
16-valve I-4, 82hp electric  
motor

**TRANSMISSION**  
Eight-speed auto

**CURB WEIGHT**  
5,165 lb.

**WHEELBASE**  
117.5 in.

**LENGTH X WIDTH X  
HEIGHT**  
194.9 x 75.7 x 69.9 in.

**SUSPENSION**  
Dual control arm (f);  
multi-link (r)

**BRAKES**  
13.6-in. discs (f); 12.6-in  
discs (r)

**WHEELS & TIRES**  
20x8.5; 275/45

**0-60 MPH**  
5.9 sec. (mfr.)

Volvo has also developed a new touchscreen interface similar to the huge tablet display in a Tesla Model S. It works brilliantly, with smartphone-like pinch-and-swipe controls. The XC90 is generally well specified, with satellite navigation as standard at all levels and conveniences like radar cruise control, heated/cooled seats, full TFT instrument cluster, and panoramic roof offered among a whole roster of toys.

But Volvo still has one more ace up its sleeve: the huge level of refinement it summons up on the move. Accepting that it can never replicate sports car-like handling due to its size (yet also throwing in the fact that it's actually surprisingly tidy through the corners), the ride is out-of-this-world good (even on 20-inch rims), while wind noise and tire roar are totally eliminated from the cabin. Never mind being as good as a Range Rover, traveling in the Volvo XC90 is like being in a Bentley. It's astonishing.

Nor does that shortage of cylinders matter, as the T8's hybrid drivetrain is completely slick and seamless in operation; 25 miles on electric power alone is a phenomenal stat for something of this heft. And performance is extremely strong. Serene manners mean keeping a close eye on the speedo, because it piles on mph with deceptive ease.

It would be unfair on the old XC90 to say this class-leading performance has come totally out of the blue, because the first generation was comfortable, practical, and popular. But after a long time on the shelf (13 years in total), the original had faded into the background of a scene dominated by German offerings. The new XC90 has burst onto center stage, though, because it is simply sensational in so many regards, at a price that seems like Volvo is doing itself out of money. This is how to execute the large SUV formula to near perfection. The Volvo XC90 is truly magnificent. **X**



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# TUNER GP

THE RUBBER MEETS THE ROAD

WORDS MICHAEL FEBBO PHOTOS ROBERT GUIDO





**Although this was the 12<sup>th</sup> year** of the *European car* Continental Tire Tuner GP, it was my first experience with the event. As I had just taken over the magazine, it was decided that upsetting the status quo probably wouldn't be the best plan. In the interest of time and simplicity, the event went off basically the same as years past. We invited tuners from across the country, provided the contenders with a set of Continental ExtremeContact DW tires, and even had cool stickers printed up.

As in the past, we invited shops to compete from multiple states, but in the end, seven cars, all from the state of California, rolled into Willow Springs Raceway on the first morning of the competition. We chose the 14-turn, 1.55-mile Streets of Willow out of the three road courses available at the facility. Streets was chosen for its elevation changes, variety of corners, and a track surface that can be politely referred to as rustic. These qualities require a tuner car that is completely developed; handling and braking are equally as important or maybe more important than big power.

The drag racing has been an on-again, off-again thing in past GPs. Last year, the straight-line competition was halfheartedly run on the uphill, 1,000-foot-long straight on the main track at Willow Springs. We attempted to run the quarter-mile competition at AutoClub Speedway in Fontana California but in the end, it just wasn't meant to be. We did repeat the dyno testing at Church Automotive Testing in Wilmington, California.

Our rules were relaxed a bit from years past, but still simple compared to most racing organizations. Classes were split into two categories based on horsepower. Touring Class was up to 400 hp while GT Class was any car above the 400hp mark. The cars competing were to be judged as streetable by our technical experts at the event. We were open to just about any and all modifications, with the exception of nitrous oxide injection—sorry, Mr. Toretto.







For the first time in the GP's history, the Italian flag was flown by Fiat. The smallest and least powerful car in the event became an instant favorite of the judges. A big-horsepower A3 was the only Audi in attendance, while BMW received the most representation by current models M3, M4, and 228. An e36 M3 reminded everyone that the older platforms are still great choices for tuners. Lastly, Mercedes' three-pointed star was only a single car, and a transverse-engined CLA45 AMG at that. The new small platform has been a huge success for Mercedes in terms of sales, and to be honest, I'm a bit surprised it hasn't made a bigger splash in the tuning industry. Unlike previous years, we were without a Volkswagen. And to us, a tuning event without a Golf is like a road trip without corn nuts.

#### **STREETS OF WILLOW—TIMED LAPS**

For overall fastest lap, the GT favorites going into this were definitely the M3 of Platte Forme AG and the M4 of European Auto Source. Both cars were running 295/30-18 tires on both the front and rear, as well as a full complement of bolt-ons. In the past, 034 Motorsports has shown up with cars either built specifically for the event or at least track events in general. This year's car is the stuff of nightmares for all the ponycar drivers in 034's hometown of Fremont. It's a relatively stock-looking A3 VR6 with a turbo kit capable of almost 700 hp.

In Touring Class, the CLA of HG Motorsports and the 228 of GSR Motorsports both looked like the strongest contenders with the more race-focused BMW having to contend with the AMG's all-wheel drive. The two lowest horsepower cars, Avus Autosport's e36



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M3 and FiatTech.com's Abarth looked as though they would valiantly fight amongst themselves.

In the first GT practice, Rif Dagher in the Platte Forme M3 came out swinging, throwing down multiple laps in the 1:24 range. Jordan Yost in the EAS M4 put in

a 1:29.138 in single hot lap. 034 Racing's Gary Sheehan ran three conservative laps, with the fastest breaking the 1:30 mark. In Touring, Nick Richards in the GSR 228 showed off some insta-speed, putting in a fastest lap of 1:27.453 while Clint Boisdeau in the HG CLA ran an impressive 1:28.571.

Joe De Vivo in the Abarth ran a respectable 1:37.116, while Amir Bentatou went with an interesting strategy and slept in, missing the first practice session in his e36.

Practice Two saw most of the competitors shaving off a second here and second there, while dialing the cars into the track. 034 Motorsports skipped the second session, while Bentatou went out and was immediately running in the low 1:28s. By the end of the session, the little red e36 M3 was down to 1:27.27, supporting my theory that starting anything before 10 a.m. is generally a mistake.

Practice Three was again mostly about fractions of a second. Dagher's M3 was now in the mid-1:23s, but EAS had found some big speed dropping into the low 1:26s. If EAS could find another big jump like that before the final, they would be in serious contention for the win. 034's A3 still seemed to want to play things close to the vest, running some tests but pulling into the pits without passing start/finish on laps. Bentatou's M3 was covered in as much adhesive horsepower as the rest of the field combined, and he was putting it to good use. The years of development time and careful selection of tuning products allowed him pull a 1:26.794, suddenly nipping at the heels of EAS's M4. How's that for progress?

Walking through the pits in the afternoon before the actual timed laps was exactly like walking through any situation in which I should have had a scooter. I say this more as a note for myself than being useful to you, the reader. I wish I could say it was as emotionally charged as a method acting class at a community college, but this was a rather laid-back affair. As the GT cars staged, Dagher was looking confident, yet there still needed to be a level of strategy. He could probably shave another couple of tenths if he had to, but EAS had to shave a couple of seconds. Do you go out and shoot for the best time and risk damaging the car, or do you run conservatively and put in the safe time, gambling that EAS won't be able to find all the time?

EAS, on the other hand, had to decide if they wanted to pull out all the stops and shoot for first or live by the adage, "To finish first, first you must finish." On top of that, we still didn't know what 034 was really capable of.

Dagher laid down a 1:23.479, which was not his fastest lap of the day, but not far off. Clearly, he had decided to play it

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at least a little safe. EAS launched out of the pits leaving tire smoke and awesomeness wafting in the air. The timed runs consisted of a decent amount of tire spinning and backend sliding, which accounts for awesomeness, but is also detrimental to absolute speed. Yost in the EAS M4 turned an exciting-to-watch 1:26.290 lap. We expected big things from 034 Motorsports, and the A3 was clearly fast in a straight line but just couldn't quite hang with the other GT cars in cornering speed. It was on considerably narrower tires. In the end, they managed a 1:28.727.

When the Touring Class took the track, all eyes turned to the CLA45 of HG Motorsports. Hired gun Clint Boisdeau is known for pulling off some incredibly fast laps in Time Attacks and Time Trial events. He managed to shave another half a second off his previous best time for a 1:27.660, which was good enough to beat Nick Richards' best time during practice in the GSR 228. Nick, however, also found more speed during the lunch break and came back out to run a 1:26.451, proving tacos make everything better. Joe De Vivo drove the crowd favorite Fiat to a valiant 1:35.356 using every last horse that the pint-sized 1.4L could deliver. OK, it's a little over 2 pints, whatever.

The real shocker, however, came from the silky smooth driving of Amir Bentatou. While others teams seemed to be sniping time by the tenth, Amir gunned down nearly 2 seconds during taco-time, running a 1:25.920 in his 18-year-old M3.



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The ExtremeContact DW is Continental's ultra high-performance summer tire that is a natural choice for the European tuning market. The company as a whole is one of the leading German suppliers of automotive components. Its tires are used standard equipment by just about every European OE selling vehicles in the United States from Audi to Volvo.

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We have driven these tires on a variety of vehicles ranging from lightweight tuner cars to large luxury sedans and have been continually impressed.

We looked at the video; he didn't find a shortcut. That time not only earned him the win in Touring, it was good enough for second place overall. This is why we can never emphasize enough the importance of solid, well-balanced tuning and development time spent on racetracks.

## CHURCH AUTOMOTIVE TUNING DYNO TESTING

After a day at the track, the dyno is supposed to be the easy part. Hook up the cars, take a few pulls, have some pizza, and then it's another year in the books. Nothing is ever easy. Modern cars don't like to be dyno'd. The car expects a specific amount of load. It wants all four wheels spinning, and at least I'm convinced, it isn't crazy about the sensor in the tailpipe. Every car other than the Fiat and Amir's M3 was unhappy being dyno'd. We accept that these numbers are merely fair estimates of what the car is



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# FINISHING ORDER



## FIRST PLACE

**Team:** Platte Forme AG  
**Car:** '15 BMW M3  
**Driver:** Rif Dagher  
**Lap Time:** 1:23.479  
**Dyno:** 549 hp  
**Modifications:** Burger Motorsports JB4 tuner, JRZ RS Pro dampers, Eibach race springs, Ground Control camber plates, Brembo Calipers and Type III rotors, Volk ZE40 18x10.5-inch wheels, Autotechnik rear spoiler, Sabelt GT-130 seats



## SECOND PLACE

**Team:** Avus Autosport  
**Car:** '97 BMW M3  
**Driver:** Amir Bentatou  
**Lap Time:** 1:25.920  
**Dyno:** 269 hp  
**Modifications:** Port and polished head, stage 2 cams, shorty headers, Y-pipe, 3-inch custom exhaust, custom differential, KW coilovers, VAC Motorsports control arms, WP big brake kit, Forgeline RS 17x9.5-inch wheels, Marvelous Tune front splitter and canards, Origin Lab rear wing, Bride Brix 2 seats



## THIRD PLACE

**Team:** European Auto Source  
**Car:** '15 BMW M4  
**Driver:** Jordan Yost  
**Lap Time:** 1:26.290  
**Dyno:** 564 hp  
**Modifications:** Burger Motorsports JB4 tuner, Akrapovic Evolution Exhaust, Raceworks downpipes, KW coilovers, Apex EC-7 18x9-inch wheels, BMW Performance aero-kit



## FOURTH PLACE

**Team:** GSR Autosport  
**Car:** '14 BMW 228i  
**Driver:** Nick Richards  
**Lap Time:** 1:26.451  
**Dyno:** 335 horsepower  
**Modifications:** Burger Motorsports JB4 tuner, AFE intake, GSR Technik catless downpipe and muffler delete, Aasco flywheel, Clutchmasters FX250 clutch, Wavetrac limited-slip differential, KW World Challenge Spec coilovers, Apex EC-718x9.5-inch wheels, BMW decklid spoiler



## FIFTH PLACE

**Team:** HG Motorsports  
**Car:** '14 Mercedes-Benz CLA45 AMG  
**Driver:** Clint Boisdeau  
**Lap Time:** 1:27.660  
**Dyno:** 347 hp  
**Modifications:** KW Clubsport coilovers, HRE R101 18x8.5-inch wheels, HG Performance brake rotors, Recaro seats, HG Performance rollbar



## SIXTH PLACE

**Team:** 034 Motorsports  
**Car:** '06 Audi A3 3.2 Quattro  
**Driver:** Gary Sheehan  
**Lap Time:** 1:28.727  
**Dyno:** 615 hp  
**Modifications:** 034 Motorsports; Stage 1 turbo kit, Precision 6262 turbo, intake manifold, billet fuel rail, 85mm MAF, X34 intake, 3.5-inch turbo-back exhaust, ECU and D5g tune, Bosch 850cc injectors, KW Clubsport coilovers, 034 Motorsports; rear sway bar, endlinks, trailing arm bearings, adjustable rear-upper control-arms, TTRS rear A-arm bushings, Rays CE28 18x8-inch wheels, Audi TTRS front brakes



## SEVENTH PLACE

**Team:** FiatTech.com  
**Car:** '12 Fiat 500 Abarth  
**Driver:** Joe De Vivo  
**Lap Time:** 1:35.356  
**Dyno:** 202 hp  
**Modifications:** RoadRace Motorsports Piggyback tuner and Intake, Abarth Motorsports catless downpipe, Magneti Marelli springs, Koni FSD dampers, RoadRace Motorsports brake pads, OZ Racing Alleggerita 17x7-inch wheels, Sabelt seat



putting out and that they make for decent comparisons among the cars present. As we suspected, the 034 Motorsports Audi A3 was a monster. The turbocharged 3.2L VR6 cranked out a clearly undisputed dyno, winning 615 hp at the front axle. Next up was EAS's M4 delivering 564 hp, followed closely by Platte Forme's similarly modified M3 at 549 hp.


When it came time for our Touring class to hit the rollers, it became obvious we weren't going to get any disputes about our 400hp limit. Taking home bragging rights was the HG Motorsports CLA45 AMG. We were told the already potent 2.0L turbo hadn't received much attention before the event because it was so new and already developed 360 hp at the crank right off the showroom floor. After delivering 347 hp to the wheels, we believed them. Following up closely behind was another 2.0L turbo in GSR's BMW 228. Rated at only 240 hp from the factory made the 335 hp at the wheels a pretty impressive feat.

Next in line was our road racing standout the Avus Autosport e36 M3. Its naturally aspirated 3.2L inline-six effortlessly spun the hub-dynos to the tune of 269 hp. Pretty impressive for an "old engine." Not surprisingly, the smallest by a long shot Abarth engine was the little engine that could, cranking out 202 hp. The Abarth engine is notoriously difficult to tune, and that 202 at the ground is incredibly impressive for the 1.4L.

THAT'S A WRAP

For a learning year, we considered this Tuner GP a relative success. All our competitors demonstrated their collective abilities to squeeze more performance out of cars that are becoming better and better from the factory every year. A few of them clearly demonstrated the importance of complete tuning program and addressing the car's performance as a whole.

We have bigger plans for next year's event. We are looking at options for a new facility, considering a different tire in Continental's product line, and are weighing the value of dyno testing. We're keeping the things that worked and getting rid of what didn't. We are hoping that by providing plenty of notice and picking a date that doesn't conflict with other events, we will be able to draw tuners from across the country.

The goal of the *european car* Continental Tire GP is to give performance tuners a place to show off their abilities and technology while competing against each other. This isn't a car show, and it isn't about popularity. If you're a tuning shop and interested in competing, drop us a line and tell us why you deserve consideration. We're looking forward to the next one. 

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**Most of the world lives with seasonality.**

The weather changes, you stop what you're doing, and you live with it. We are in northern Germany to prove that thinking wrong by taking one of the most lavish and powerful convertibles in the world to a place least suitable for it—the legendary Nürburgring's Nordschleife on its winter vacation.

Forget the Bates Motel—as Scooby-Doo taught us, a place like an abandoned amusement park is what scares us the most. The immobile merry-go-rounds and rotting Ferris wheels have something very disturbing about them. Nothing's moving, but you're scared to death knowing something bad will happen at any moment. It's the same kind of a creepy feeling that fills the Nordschleife for a big part of the year, 16 miles of the most frenetic road in the world sitting silent among German forests and mountains.

correct and slightly boring lives—as you do in Germany. A few meters above them, all the historical bends and straights still lie there, hibernating, without anyone daring to get near them. The access roads and paddocks are filled with snow, virtually impassable. Why would anyone want to get there now anyway? Even in the best of conditions, the Nordschleife proves to be too challenging for a lot of drivers coming here each season from all over the world. Now a contender confronts different kinds of challenges: You have to be really careful while approaching Breitscheid as the black ice on the descending road makes braking impossible, while just a moment later the same ice on the steep Ex-Muhle corner tests the car's power reserves and the driver's bravery alike, as the only way to climb to the top is to keep the right foot pressed to the floor. The iconic Karussell is no longer banked, resting under an even surface of a snowdrift, and for once I am not asking for more power on the fast Antoniusbuche curve but for a snowplow. The barriers that are too near even in July seem to be even nearer now, and the slippery bits are even more slippery, each mistake more unforgiving and its consequences more painful. For the hell, White is the new Green.

# FROZEN

WHITE IS THE NEW GREEN WHEN WE TAKE AN ASTON MARTIN TO A SNOW-COVERED NÜRBURGRING

WORDS MATT ZUCHOWSKI PHOTOS KONRAD SKURA

In winter, it's probably even a more amazing than during the time you know from the photos or your own visits. Iconic places immortalized in thousands of photos of tuned BMWs or Porsches and guys wearing shirts saying "Nürburgring for life" now turn out to be perfectly normal towns, gas stations, and parking lots, where German people lead their



Hopefully, the threat of the Nordschleife changing its status from temporarily deserted to permanently abandoned due to the Nürburgring's investors' fishy businesses seems to have been lifted so that the track-dayers and racers will come back here once the hell turns to green again. But before that, we've got our unique chance to tackle it off-season. What car would be more appropriate for the job than the '15 Aston Martin DB9 Volante: a 510-bhp RWD grand convertible with a \$203,295 price tag hanging from its fragile side mirror? OK, maybe with the sedan-like dimensions and nearly 2-ton weight, this is not the default choice for a winter track day tool. The anxiety rises even more when you realize that this is a peculiar car of special value, one presented at the recent Paris Motor Show, as indicated by the commemorative plate inside and the bold color combination in and out, showcasing the manufacturer's individualization abilities. A gulp ensues after learning that since the Paris performance, this impeccable DB9 has done just a few miles, spending the rest of its short life stored in an air-conditioned garage due to its historical significance. Gulp. Time to take a brave pill and think of a very good excuse of how I got lost and miraculously found myself in the middle of the Nordschleife in case something goes wrong. Because something will, won't it? One part of my mind is pretty sure it's inevitable, but if the Aston succeeds, it'll prove that modern supercars—the ones without roofs included—are more versatile than any driver would ever need and can be driven even in the most improbable conditions.

Good news first: We've got winter tires on and it's so sunny that despite the biting cold, we can take the roof down and allow ourselves to be warmed by the sun and the extra-effective heater. There is some bad news, too, though: To get to the narrow de-snowed lane for the technical vehicles in the middle of the track, first we need to tackle the road leading to it, covered in powdery snow so deep it reaches DB9's side sills. After going through the gate, there's no turning back: right leg pushed to the floor, the mighty V-12 screaming, front bumper fighting through the snow, rear wheels creating total havoc. A moment later, everything settles down and the track becomes as quiet as it has been for the last weeks, as the DB9 victoriously finds its way on the tracks. I'll think of how to get back to the civilization later and now just allow myself to adore the sheer beauty of this car.

It's quite an ocular feast, this thing. Volante was born out of chopping the roof off of one of the most beautiful coupes in the history of the British Empire, and you must admit that this is one of those very



few cars that manages to maintain the quality of the original design when going topless, if not improving it. Closing the light fabric roof is a reasonably fast and easy process, for the car at least: It takes 17 seconds and doesn't take away much of the functionality—only 0.5 cubic feet of the trunk (though with the 6.6 cubic feet of the total cargo volume, each little bit is priceless), and even with the roof up, it's not that much less comfortable in here than in the coupe.

DB9 has been around for 12 years, during which it has gone through the hands of three great designers: The first concept by Ian Callum was refined by Henrik Fisker before going into production, while Marek Reichman gave the aluminum body its biggest face-lift for the model year 2013. Inexplicably, instead



**"If the Aston succeeds, it'll prove that modern supercars can be driven even in the most improbable conditions."**



of aging, the DB9 becomes only fresher and sexier with time. Its elegant cabernet sauvignon lacquer and the doors swinging up gently while opening like swan's wings make a captivating contrast with the raw arctic landscape surrounding it. The Volante looks completely different from its main rivals: Bentley Continental GTC, BMW M6 Convertible, Porsche 911 Turbo Cabrio, or Mercedes SL AMG. They look bland or at least overweight.

Still, you may get the impression you saw these sleek lines, crisp muscles, and accentuated rear spoiler somewhere before. They are best known for appearing on the Aston Martin Virage, a short-lived model that, after less than a year of market career, took a bullet but did not end its life as a future rare collectible because it reappeared as the new DB9 differing in virtually nothing more than the badge on the decklid. That gave the DB9 an improvement in terms of performance and quality as the late Virage was positioned higher in the model hierarchy, halfway to the flagship DBS (...which was succeeded by Vanquish, which turned out to be confusingly similar to the new DB9... that is Virage... the new DB9, that is).







Putting family identity drama aside, DB9 seems to be the sweet spot of the Aston's V-12 lineup now. Nobody, apart from hard-core geeks, would bother to see the difference between it and the Vanquish, which is far pricier for no other reason than to boost the owner's ego, and nobody, apart from those geeks, would want to buy a V-12 Vantage and live with it for years. Assuming you're not dramatically vain or a kind of person who lights a cigarette with a burning torch, DB9 is the one for you.

And right now, it really is the car to go for. For years, DB9 has been too flawed and compromised to be regarded as a great performance GT. Previous generations of it left the impression of being underdeveloped as the small annoyances were taking away a big part of the driving experience. For most of its life, the chassis was everything but involving—and it was even more apparent in the Volante version. The soft body clattered and flexed, while being hampered with the rather lousy automatic gearbox. But then the Brits got the time and money—and the Aston Martin Test Center. The facility stands just around the corner from the Nordschleife's main straight, where a huge part of the company's R&D is orchestrated. Aston's engineers have honed the project and ironed out all the imperfections. The result—a sports car competent throughout, what the DB9 has always deserved to be. It'd be wrong to call DB9 outdated. In fact, it only came to be up to date—just like the constantly evolving Porsche 911, now on the top of the buy list of the third or fourth generations of drivers.

Although it is based on the same VH platform, mid-year 2015 cars share virtually no screw with the first DB9. The chassis has seen numerous updates through the years and benefits from the additional rigidity and the much-needed roominess of the carbon-fiber-aided Vanquish structure; it's grown 20 percent in terms of its stiffness. Goodies nicked from the Virage take DB9 to the next level of looks, refinement, and poise, turning it into a car of broader abilities. The interior is still hopelessly unergonomic and showing its age now with the Mercedes SLR and Maserati Granturismo-era design. It has increased in quality, and the horrible Volvo navigation system was replaced with a slightly less irritating Garmin-sourced interface.

Carbon-ceramic brakes shave off 28 pounds from the unsprung weight, and the new gearbox has been installed at long last. This is a brilliant eight-ratio ZF auto that makes the DB9 both a more sophisticated grand tourer and a more effective sports car. This automotive schizophrenia goes further due to the adaptive suspension, developed on these very bends some





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## TECH SPEC

### '15 ASTON MARTIN DB9 VOLANTE

#### BASE PRICE

\$206,120

#### PRICE AS TESTED

\$225,030

#### LAYOUT

Front mid-engine, RWD, four-seat, two-door convertible

#### ENGINE

5.9L, 510-bhp/457-lb-ft, DOHC 48-valve V-12

#### TRANSMISSION

Eight-speed auto

#### CURB WEIGHT

4,167 lb.

#### WHEELBASE

107.9 in.

#### LENGTH X WIDTH X HEIGHT

185.8 x 75 x 50.5 in.

#### SUSPENSION

Double wishbones, coil springs, antiroll bar

#### BRAKES

Six-pistons calipers, 15.7-inch rotors (f); six-piston calipers, 14.2-inch rotors (r)

#### WHEELS & TIRES

20 x 8.5 (f), 20 x 11 (r); Pirelli P Zero 245/35 (f), 295/30 (r)

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months ago (when it was much warmer, presumably). Thanks to that adjustability, the suspension can cover everything from a cossetting long distance drive to, well, tackling the Nordschleife.

The long list of minor improvements has made DB9 a more sublime and gentle car, but thankfully its makers haven't had the will (or at least abilities) to make it in accordance with today's unfortunate trends. No downsizing or hybridization here. DB9's heart is a real aristocrat among engines—fantastically big, naturally aspirated, and smooth—even if its beginnings were humble: It started its life in 1996 under the bonnet of one of Ford's concept cars, coming, in fact, from sticking together two 3.0L Duratec V-6s. Since then, it has powered a wide array of Aston Martins in an even greater multitude of versions, starting from DB7 in the '90s all the way up to the Rapide and later the bonkers Vantage. Come 2015, under the bonnet lands the new AM11 derivative of the 5,935cc block, tuned to 510 bhp—that's 40 British ponies more than before. In the times of engines relying heavily on turbochargers that build the massive torque all the way from the lowest revs, you could imagine that some people pressing the fast pedal in the Aston may actually think something's wrong. It's the other way around, guys: While

environmental issues have neutered some of the finest engines, the old-school Aston motor is refreshingly cool. It bites back ferociously at each press of the throttle and builds power linearly through the whole rev scale up to 6,500 rpm, when the maximum power output and some serious sounds occur. Maybe half a thousand horsepower doesn't allow for a sensationally fast drive in comparison to the other (often turbocharged) convertibles at the price, but there are few things more monumental than the sound of Aston's V-12 in full attack.

Obviously, driving the Nordschleife in winter is nothing short of extreme, swinging the car from understeer to oversteer abruptly corner after corner. At first, none of these things are fully appreciated by the panicked driver (that's me), but after my mind accepts the idea of drifting a \$200,000 510-bhp RWD sports car on the frozen Nordschleife, the DB9 actually becomes good at it. Thanks to its long wheelbase, good weight balance, and linear power delivery. So good, in fact, I actually start wondering if I really am the first to bash it around the Nordschleife this time of the year... But even if the Aston's engineers don't come up with such crazy scenarios, they still make the cars capable of providing exceptional driving experience—anywhere, anytime. 



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# ALL-WHEEL ANNIVERSARY

THIRTY-FIVE YEARS OF THE AUDI UR-QUATTRO





**L**ooking back through history, barely a handful of cars have significantly changed the way cars are designed, marketed, engineered, or built. Obvious ones that come to mind immediately are the Ford Model T, Willys (Jeep), and the Austin Mini. Fans of the VW Beetle might include it, but apart from a handful of cars (the Corvair), its design was not one that changed things. It's definitely fair to include the original Audi quattro (yes, in lower case) on the list.

As Audi celebrates the 35<sup>th</sup> anniversary of the introduction of the ur-quattro, as the original model is affectionately called, it's worth looking back at how it came to be and how it has influenced the design and engineering of so many performance cars since 1980.

Prior to then, four-wheel-drive systems were mostly found in trucks and off-road vehicles. And, apart from a handful of vehicles such as the Range Rover and the AMC Eagle, they were part-time systems. Jensen, the low-volume British maker of luxury cars, produced the Jensen FF with a permanent all-wheel-drive system back in 1966, but it only sold a few hundred vehicles.

#### AUDI GOES RALLYING

In the mid-1970s, Audi was doing some limited rallying with the FWD Audi 80 (4,000 in the USA), but the company realized it would need something more potent if it were to compete successfully in the WRC. Audi engineers witnessed how well the Audi-designed Iltis, (VW's off-road vehicle for the military) traversed snow and wondered if its AWD system could work in an Audi 80.

One of those engineers happened to be Dr. Ferdinand Piëch, grandson of Ferdinand Porsche, who already had a track record, having developed the famous Porsche 917 race car. So they began shoehorning parts from the Iltis in some rally cars and conducted secret tests that proved they were on the right track. Piëch and others convinced the Audi and VW bigwigs that a car with AWD would not only make a great sporty luxury car for all seasons but also a formidable rally car. After some lobbying, the FIA modified rules to allow AWD cars to compete in rallies. Since other manufacturers—including Ford—had tried it, nobody thought AWD cars would take the sport by storm.

In September 1979, Audi invited Hannu Mikkola, then the top Ford factory driver, to try a prototype Audi quattro. He was so impressed that he signed up immediately as an Audi team driver. Not long after that, the rumors began to circulate—Audi was going to compete in the WRC championship with an AWD car with Mikkola. The rally fraternity found this rumor hard to believe. “Why would a front-running WRC driver leave an established team to drive for one with no track record in the WRC?” Ironically, Ford had to confirm that Mikkola was indeed leaving its team before naysayers began to believe the rumors.





Needless to say, when the first production quattro was unveiled at the Geneva Auto Show in 1980, it immediately drew rave reviews. Far from being just a homologation special, which would only require that 500 be built, it was an honest road-going, entry-level, luxury coupe with incredible handling and the ability to traverse roads in bad conditions with aplomb. What's more, unlike other vehicles with four-wheel-drive systems at the time, it was not intended for off-road use.

#### QUATTRO'S SECRET

Essentially, the breakthrough that allowed Audi to build a low-slung, road-going, AWD car was the ability to use a modified Audi 5000 gearbox without the need for a transfer case. Since the Audi 80 and 5000 used an engine mounted longitudinally, the driveshafts for the front wheels came out of the side of the front of the gearbox. All the engineers had to do was use a hollow output shaft with a secondary shaft running through the center to take drive to the rear wheels, which used a modified front suspension from the 5000. It was an elegant solution that did not add height and little weight (about 167 pounds) to a regular FWD car.

Instead of building a rally car using the four-door Audi 80, Audi decided to make a distinct coupe, which was styled by Martin Smith who worked alongside J Mays at



Audi. At launch, the quattro was powered by a turbocharged 2.1L five-cylinder engine producing 200 hp in European trim or 167 hp with U.S. specs. Although the car was not conventionally handsome, it had a mean look to it, which was well suited to its future role as a halo car that would transform rallying and Audi's image.

#### TOTALLY CHANGING THE FACE OF RALLYING AND RACING

Audi announced its intention to compete in the WRC at the same time it introduced the quattro in 1980. The first year would be regarded as a development year. Initially, the team would have two cars with Mikkola and Arne Hertz in one and Michele Mouton and Fabrizio Pons in the second factory car.

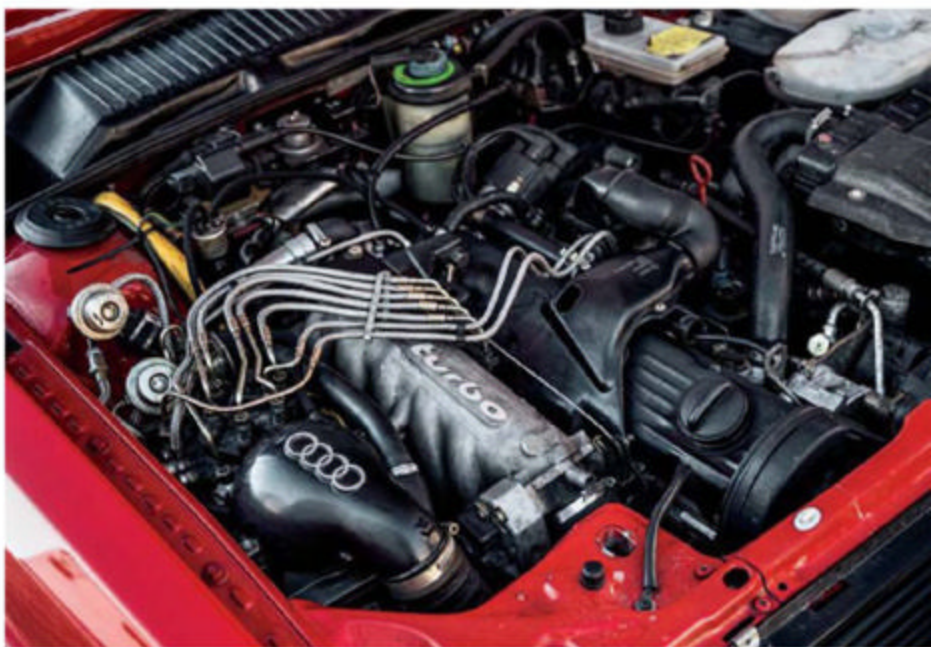
The first win for the quattro actually came early in 1981 during its first outing at a rally in Austria, which was not a round

of the WRC. Only a month or so later, Mikkola took a commanding win in the WRC Swedish Rally. Audi's competitors had been served notice. No wonder they all immediately started working on their own AWD rally specials.

Inevitable teething troubles prevented Audi from winning more than three rounds in 1981, but history was made when Michele Mouton won the San Remo rally—the first time a woman had ever won a WRC event.

Everything jelled in 1982 and Audi won the manufacturer's championship with Mouton taking three wins and Mikkola two. The following year, Mikkola won the Driver's championship, but Audi had to be content with second place in the Manufacturer's championship. In 1984, Stig Blomqvist won the Driver's championship and Audi took the Manufacturer's laurels for the second time.





By 1984, other manufacturers had built even more specialized mid-engined rally cars with the introduction of the Group B class. They quickly made the original quattro uncompetitive. Rather than build a mid-engine quattro, Audi created the quattro Sport, which had 12.6 inches chopped out of the wheelbase. It featured a special steel/Kevlar/fiberglass body with an even more powerful 306hp version of the 2.2L engine. Blomqvist took it to victory in its debut at the Corsica round.

In 1985, Walter Röhrl took the only win for Audi at the San Remo round. It turned out to be the last win for a quattro in the WRC as Audi (and Ford) withdrew from the WRC in 1986 following the fateful Portugal rally. Not long after, the FIA abandoned Group B cars on safety grounds.

It was not the last anyone would see of the monstrous quattro Sport, though, as Audi sent one over with Michele Mouton to compete in the Pikes Peak hillclimb in 1985. A year after she had first tackled the event in a regular quattro rally car, she won and broke the record, much to chagrin of the locals. They were much happier the following year when Bobby Unser drove the car to set an even faster time. A year later, it was Walter Röhrl's turn and he knocked another 20 seconds off the record with the first under-11-minute run up the 12.4-mile dirt road.

Audi's U.S. arm entered the SCCA ProRally series in 1982 just after the

road-going quattro was launched in the USA. With accomplished American John Buffum at the wheel, the team took the championship three times in the next five years.

In 1988, it decided to tackle the TransAm series with an Audi 5000 quattro with Hans Stuck as driver. The car was so fast in all conditions that Audi won the championship title with ease. The SCCA then promptly banned AWD cars from the series! Undaunted, Audi switched to a 700hp space-framed Audi 4000 and competed in several rounds of the IMSA GTO series with Stuck and Hurley Haywood. They garnered several wins, but mechanical problems and accidents meant the team had to be content with second place in the championship. Audi decided to mothball the program in the USA and instead turn its attention to competing in the DTM series in Germany.

The rest, as they say, is history as road-racing versions of numerous Audis progressed by leaps and bounds, culminating in the dominance shown at Le Mans with 13 wins in the past 15 years. The ur-quattro certainly changed Audi's image and helped transform rallying and racing.

#### QUATTRO FOR ALL AUDIS

The first generation of the ur-quattro had a 50/50 split of power front/rear wheels with center and rear differentials that needed to be manually locked for maximum traction. In 1988, these were replaced by two Torsen diffs that worked their magic automatically distributing power to opposing wheels, as grip was lost. Since then, there have been several iterations of the quattro system, which have been offered in every Audi model made since 1985.





Michele Mouton (left) and Hannu Mikkola (right) have a friendly chat before the start of the 1981 Acropolis Rally.

#### SALES NUMBERS

During its 11-year run from 1980 to 1991, more than 11,000 ur-quattros were sold worldwide. Only about 650 quattros were sold in the USA between 1982 and 1986. To date, Audi has sold more than 6 million Audi models with a quattro system, just under half of all models it has produced. In the USA, about 90 percent of all Audis currently sold are quattro models.

#### PERSONAL EXPERIENCES

In the summer of 1979, I visited Audi's factory in Ingolstadt in order to test drive the Audi 80 rally car for an article I was writing. A friend of mine who was a journalist with *Auto Motor und Sport* told me to ask Jürgen Stockmar, who was an engineer in charge of the rally program at the time, about the "Quattro." He would not tell me more. So when I asked Stockmar,

he said, "Who told you that?" After we'd established that we had a mutual friend, Stockmar proceeded to tell me all about the quattro but said I could only write about it as a rumor and not mention the word quattro. Obviously, I was not the only journalist with this privileged information as my rumor matched those of others at the time.

I was not told that the car would be a road-going sports coupe, just that it would be a revolutionary rally car. Imagine my delight when the actual quattro was launched in 1980. I revisited Ingolstadt a few weeks afterward when I was allowed to borrow a quattro for a couple of hours. It turns out that I was one of the very first journalists to try a car on my own. Others had driven it briefly in Geneva but under the watchful eye of Audi engineers and PR folk. My expectations were high, and the reality matched them. Even though I did not get to drive in snow or rain, I was astounded by the car's handling.

In 1981, I went to Greece to see the quattro rally cars in action at the Acropolis Rally. I was lucky enough to have a ride with Michele Mouton on a stage set up for demonstrations. To this day, it remains the most exciting ride I've ever experienced. The way she threw the car through corners was amazing. But watching her feet dance between the three pedals as she drove at near race speeds was even more fascinating.



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The next time I drove a quattro was at the media launch of the U.S. version in 1982 in California. We got to drive the cars from Badwater at the bottom of Death Valley with instructions to go as high up Mount Whitney, 135 miles away, as possible. In no time at all, a procession of 12 bright-red Audi quattros was scorching across Death Valley at more than double the 55-mph speed limit. Sadly, by the time we got to the snow level on Mount Whitney, we came to a locked gate. Nevertheless, a few hours later, we were driving the cars in snow at Mammoth.

From there, I drove to Arizona and on one stretch of two-lane highway, I managed to traverse every corner at double the suggest speed, although I admit I chickened out when I came to one with a 55 recommended speed! I let Malcolm Smith and an amateur rally driver try the car and they were both impressed, even though they found the handling characteristics at the limit on dirt took some learning, as the experience was so different from a RWD rally car or off-road racer.

In 1993, I was finally able to drive a Sport quattro, one of a handful privately imported into the USA. The one I drove belonged to Frank Beddor Jr., the founder of the quattro Club, which is now the Audi Club of North America. The Sport was, as I expected, a handful. Turbo lag meant the revs had to be kept high to obtain maximum performance, and it was so brutal that it was honestly not much fun driving on a highway with other traffic to contend with. But that sound—wow!

Not surprisingly, with my quattro experiences early on, it went on my list of aspirational cars to own. Sadly, I could not afford the then high cost of \$35,000 or so for a new one. I had to wait to fulfill my desire 10 years later when I purchased an '83 ur-quattro for \$10,000. It was in pretty good condition, and I modified it a little during my three years of ownership. It was featured in the December 1993 issue of *European Car*. 🇩🇪





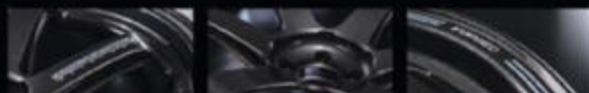
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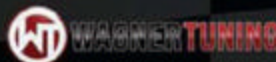
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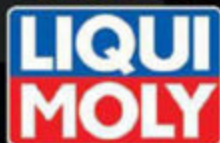
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# FIAT ABARTH PROJECT: PART II

MORE GRIP, LESS GROWL

Words Michael Febbo Photos Guio and Michael Febbo

**The Fiat Abarth** is a bit of a tuner car right off the showroom floor. Compared to its stablemate, this raucous compact's edges are far sharper and aims more focused. With that in mind, we sought out tuning products that offered factory levels of quality and refinement but also offered a performance edge.

Our particular Abarth has a rather healthy sticker price just north of \$30,000 that includes a set of forged 17-inch Abarth wheels. The Abarth wheels are light for factory equipment weighing in at approximately 18 pounds. The factory chose a Pirelli P Zero Nero in 205/40-17 as the only option on the car. We found the Pirellis to be plenty sticky, but the ride was a bit harsh and break away was abrupt and catching the tire was also equally as abrupt. After talking to a friend at Tire Rack, we were told we probably wouldn't be able to find more maximum grip without going to a race tire, but we could definitely find different characteristics.



The complete Bilstein PSS B14 system ready for install. Average street price for this is less than \$1,000.

Although the factory wheel is light, we found a new wheel from Italian manufacturer Fondmetal that offered the same 17x7-inch size in a lighter package. The 9RR is a new design forged in Italy and meets all the rigorous standards for TUV approval. The multispoke wheel is just 16.5 pounds and has a slightly more aggressive 30 mm offset compared to the factory's 35mm offset. Essentially, it means the wheel sits 5mm further to the outside, increasing the car's track width by 10 mm. We considered a wider tire and wheel package, but after talking to several sources, we determined it required either rolling the fender lips or living with some tire rub. Neither of which sounded appealing to me.

Knowing that our 500 would probably never see anything more than a light drizzle, we chose a tire that would work well in canyon driving, commuting or at the track. The Falken Azenis RT615K has a UTQG tread wear rating of 200. The OE Pirellis were looking rather worn after just



Installation is straightforward: remove brake lines and wires from strut clips, remove two bolts attaching strut to spindle.



Aaron Neumann of Neu-F loosens the top-nut holding the factory strut in place. Once this is off, the strut can be removed making way for the Bilstein upgrade.



You will need to reuse the factory upper strut mount and bearing or better yet, buy new pieces to install on the new Bilsteins.



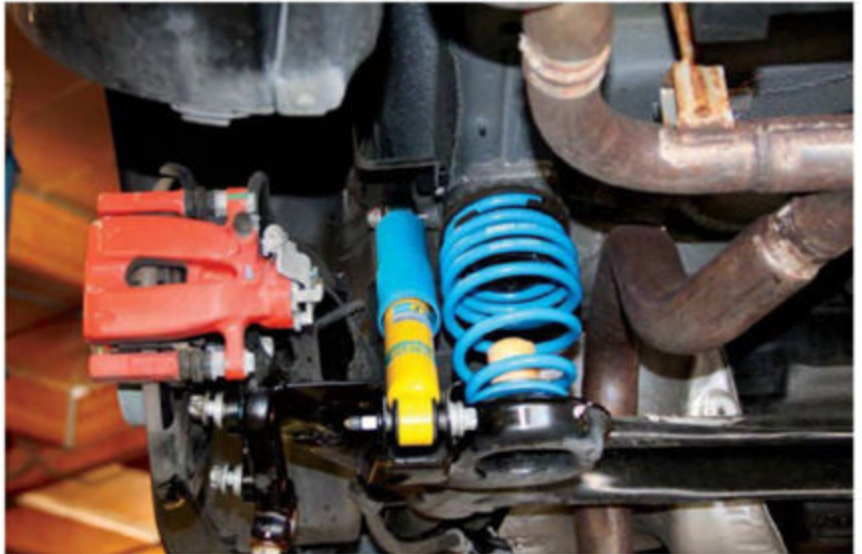


The factory shock, spring and torsion bar, again the installation process is straight forward and videos are available online that are far better than any instructions we can provide in writing.

10,000 miles and they carry a 220 rating. In fairness, we should have rotated the Pirellis at 5000 miles as the rears looked nearly new. The Falkens offered another 1-pound weight savings, not huge, but it all adds up in unsprung and rotating mass.

From the factory the Abarth offers a good compromise of ride quality and body control. With the car having a width to height ratio worse than many SUVs, we wanted to get the center of gravity down without compromising suspension travel. Bilstein offers its B14 PSS coilover kit for the Abarth that allows for 30-50mm, roughly 1.2-2.0 inches, of lowering and features monotube dampers with optimized length for the lowered ride height. The front struts are coated with Bilstein's proprietary Triple-C coating for corrosion resistance while the rear spring seats are machined from aluminum. The spring rates are substantially stiffer 315 lb/in in front compared to the stock 195 lb/in. In the rear, the stock rate is 220 lb/in while Bilstein uses a progressive rate spring that starts at 190 lb/in and ramps up to 370 lb/in.

The Abarth has a tendency to feel rather pointy on turn-in. You feel as though you're sitting towards the back of the car and you swing the nose around. One of the qualities that define a good driver's car is how it rotates. All the greats feel as though the entire car commits at once. On turn-in, you feel the car yaw around you with the nose diving into the turn and the rear responding, rotating around the outside. This isn't oversteer, it's just the "rotation" you hear us refer to all the time. The Abarth doesn't have that and we are looking for it. To try and loosen up the rear a bit more, we've opted for the Neu-F rear torsion bar. While



Bilstein shock and spring installed. The ride height adjustment is handled on the lower spring seat and can be done without any disassembly.



The Neu-F rear torsion bar is far stiffer than the factory piece. It looks better too, but it's the oversteer we're after. Retail straight from Neu-F is \$169.95

all anti-roll bars are essentially torsion bars, the Abarth has a unique set-up that ties the torsion beam suspension together with a common bar. The factory piece is 22 mm while the Neu-F bar is 28 mm in the center and tapering down at both ends.

While we were at Neu-F we also chose to pick-up a P-Flo system to replace the factory airbox and try out an exhaust system that uses a rear muffler. Surprisingly, the stock Abarth system is straight pipe with no muffler. The P-Flo is said to offer faster throttle response, more sound and we hope it frees up a couple of horsepower as well. It is beautifully made and best of all, is CARB exempt.

We love the sound of the factory exhaust, my neighbors however aren't as big of fans when I start up the crackling and barking



This is the factory Abarth rear exhaust section. No mufflers, ugly welds and bad bends. It does sound great and most people will never see it.





Not only will the Neu-F Pflo provide less restriction than the factory airbox, it will also keep us legal with a CARB approval sticker. \$299.95 direct from Neu-F.



This is a quality piece on its own, but compared to the factory piece, it's Michelangelo's David. It will tame the Abarth's, and hopefully my neighbors' growls. \$649.95 from Neu-F, which also sells a non-muffler version for \$549.95

tiny-terror before dawn. Also, the factory exhaust is just horrendous looking. Even with the car lowered, I had nightmares of other enthusiasts seeing what looks like an exhaust system made by a welding student his first day at school. The Neu-F exhaust puts the factory system to shame. It uses V-band clamps, mandrel bent tubing and is constructed of T304 stainless steel. The 4-inch polished tips look great sticking out of the rear diffuser the only downside is we don't expect it to make any noticeable difference in power.

We looked into a few different options

for adding more power to the car. We tried a hand-held flashing unit, but struggled with the thing for a couple of weeks before finally giving up. We ran into difficulties at quite literally every step in the process including the initial install of the company's software on a PC laptop. Immediately, we don't normally use PCs, European Car is Apple based and we have to imagine most owners buying a thirty-thousand dollar Italian small car are probably Cupertino fans as well. We thought about one of the piggy-backs on the market, but after talking to multiple people, even some with



The Fondmetal 9RR gives the Abarth some sharper edges in wheel wells while the Falken Azenis RT-615K will give a little more grip. The Falkens can be had for \$130 a piece from [Discounttiredirect.com](http://Discounttiredirect.com) while we found the Fondmetals for \$299 a piece at several online dealers.

Fiat, we decided against those as well. If a better solution comes up in the future, we will gladly give it a look, until then, we might have to settle for slight power gains.

We will be testing the car shortly for performance numbers. We don't expect huge results, but we do expect the car to be far more enjoyable on a daily basis. Thanks to Aaron Neuman for the help with the install on all the parts. The car looks better and we will see if we've met our performance goals later. 🍷



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**Poland isn't the first place** that comes to mind when you think of fine performance tuning, but actually it is a popular source of some bhp-mad projects that star all over central Europe, from Austrian Wörthersee GTI-Treffen to Russian Unlim 500+. Polish tuning specialists may be less known than the big players from the neighboring Germany, but in fact they represent such a high quality of work that they often become secret developers and builders of the cars you see on the tuning shows all over the world. Poland also boasts some world-class projects that would be deemed exceptional even on the most developed tuning scenes.

The 997 presented is without a doubt one of these projects that would receive top marks in Western Europe, Japan, or USA alike, being one of the fastest and most advanced road-going 911s not only in Poland, but in the world. You may be wondering why anyone would like to make that iconic sports car faster or more advanced than it already is, but Karol, the man behind this project, has good underlying rationale. While a Turbo was just too slow and too soft to his liking, he owned, for some time, a GT2 packed with additional ponies brought by 9ff Fahrzeugtechnik, but then he wasn't happy with the limited traction provided by the rear-wheel-drive configuration. These undoubtedly horrible struggles Karol had to go through led him to think of another 911, this time built from scratch, and based precisely on the guidelines ingrained in his mind: four-wheel drive, focused approach, and power. Lots of power.

As no tuner seemed to have a parts range extensive enough to carry out the work from A to Z, Karol chose the hard way of working on each detail individually with a group of engineers coming from the best German and Polish tuning houses, like Street Shadows Garage and ECU Performance from Poland's capital, Warsaw, here joining forces as freelancers mostly out of passion for these kind of projects. In fact, they had so much eagerness to work that all they left untouched from the car's engine was the crankshaft, all of the rest being reinforced or made out of materials dug out from the depths of the periodic table.

The most ambitious part of the work was to design a wholly new cooling system for the turbocharged air, as even

# TAILOR-MADE TUNING

BUILT-TO-ORDER 997 TURBO  
IN A GT3 RS BODY

the factory spec Turbos are keen to have problems with keeping the right temperature on hotter days when driven very hard (which is the only way Karol drives his cars). The wise car owner went for a bold idea of creating a complex water-cooling system, which turned out to be tricky to develop and build, but opened the door for downright crazy performance numbers.

A standard 997 Turbo uses traditional intercoolers located behind the rear wheels to cool down the air feeding the intake manifolds. That's where the signature side air intakes on the car's body come from, but however cool (pun intended) they look, a relatively small size of the holes limit the amount of air that can be sent to the heat exchanger, restricting its efficiency. This system is replaced by specifically developed radiators filled with 12 liters of a liquid coolant, which dispenses heat through a cooler mounted in the front bumper, armed with an additional water spray for a good measure. The finished construction proves to work very well: It remains stable even under heavy loads, keeping the intake manifold at a temperature lower by around 90 degrees Fahrenheit than originally. Good news for the engine, the performance numbers, and the driver alike, who can now keep his right foot pressed in the floor without any worries.

WORDS MATT ZUCHOWSKI  
PHOTOS KONRAD SKURA







The new cooling solution eliminated the need for the air intakes, thus allowing Karol to make another bold move: change the whole body for the updated 997.2 GT3 RS version, making his car a unique blend of the turbocharged 3.8L boxer engine and a track-ready appearance. Both GT3 and Turbo variants boast the same 1.85 m width, so the enticing hips didn't get any wider. But with the more pronounced lip on the RS front bumper and the take-no-hostages rear wing above the centrally mounted two exhaust tips, the finished effects surely look the part. As the one-piece cast magnesium wheels made by BBS for the famous Porsche racing team and tuner Manthey Motors were chosen solely for their extreme lightness and rigidity, the unique metallic paint, which now covers the headlights' surroundings as well, may be treated as the only cosmetic refinement of the car. The 19-inch rims covered in custom paint are shod with Pirelli PZero Corsa tires, sized 235/35 in the front and 325/30 in the rear.

Inside, Karol allowed for more luxuries without giving up on the extreme purpose

of the car, ending up with an eclectic mix of exclusive ambience of sublime materials and the coarse accessories taken straight from the professional competition use. Even with the over-extensive use of the delicate chocolate-colored nappa leather upholstery and carbon fiber lying literally everywhere for no other apparent reason but to please the eye of the beholder, the typically 911 interior hasn't lost any of its no-nonsense teutonic attitude. The driver and the passenger are keenly supported by the thin bucket seats of 997 GT2 origin, while the rear bench was taken out altogether, GT3 RS style. Then there are some details revealing the extreme nature of the car internals: A thermometer indicating the temperature of the water in the new cooling system is fastened boldly on a cable tie in the cabin's corner within the driver's sight, while an HKS boost controller tool mounted right under his hand allows a quick change of boost pressure.

The highlight among the interior features is a control panel hidden under the central armrest (finished with carbon





fiber, what else?). The seriously looking red buttons and the toggle switch may be taken for Bond gadgets, but in fact they're responsible for regulating the water spray and other parts of the cooling system. Definitely not something you can find in a regular 911, but then not often do drivers design their own intercoolers for their cars... And that is the best summary of Karol's expert knowledge and loving attention to details: The interior leaves a great impression of a very high level of quality, the neat and tidy effect seeming to be another one of admirable Porsche efforts, rather than the work of one dedicated car owner.

It should come as no surprise then that Karol left little to chance also in terms of the rest of components. The drivetrain is mostly stock, though the driveshafts got reinforced to deal with the power leap. The rarely used in 997 Turbo six-speed manual Getrag transmission is widely acknowledged for its bulletproof durability so it could be left without any further support, but the clutch appeared to be the weakest link. Many different

types of clutches were tried out, and the best solution turned out to be the Sachs component able to transmit up to 810 lb-ft. There is a price to its toughness, though: The left pedal needs great force to be pushed and released, making it quite tiresome for smooth, let alone comfortable, ride. The middle pedal requires no less vitality, as it is linked with competition-derived Brembo brakes with the front discs sized 380 mm in diameter, cooled down by the air led by the ducts borrowed directly from a racetrack equivalent. But hey, this car is meant to go fast, not look after my undertrained legs. Maybe I got a bit too soft with my expectations of what a true supercar should be like?

Still, even with the standard variable characteristics Porsche Active Suspension Management thrown out altogether to make room for the Bilstein PSS set with extra-thick antiroll bars (the only adjustable part), it can be said that the light car behaves relatively gently on the road, at least trying to sooth out imperfections of the road. It's not as stiff as you could've imagined it to be. After all, it was built







## TECH SPEC '10 PORSCHE 911 TURBO

### LAYOUT

Rear-engine, AWD, two-seat, two-door coupe

### ENGINE

3.8L, 800hp/740-lb-ft, twin-turbo DOHC 24-valve flat-six, stock intake, air-to-water charge cooling, custom pistons and rods, stock turbos with custom twin center outlet exhaust

### TRANSMISSION

Six-speed manual with HD Sachs clutch

### CURB WEIGHT

3,300 lb. est.

### WHEELBASE

92.5 in.

### LENGTH X WIDTH X HEIGHT

176.2 x 71.2 x 49.5 in.

### SUSPENSION

Macpherson strut (f); multilink (r), Bilstein PSS with adjustable antiroll bars

### BRAKES

Six-piston Brembo calipers, 15.0-inch rotors

### WHEELS & TIRES

BBS Magnesium wheels 19x9 (f), 19x12 (r); Pirelli Pzero Corsa 235/35 (f), 325/30 (r)



with everyday use in mind: That's why carbon-fiber seats can be folded and there's no expanded rollcage behind them—for Karol it was more important to have a handy place to drop his groceries or a bag. If you're wondering why such a great feat of engineering isn't an often guest on track days, it's only because he has some even more hard-core tools for that job. But what a joy it would be to tackle some empty corners with that monster. Even with the AWD configuration retained, the car feels far more agile and dynamic than the standard already great Turbo, but preserving that stable and effective attitude of the fastest series production 911 was fundamental to this project. As to the speeds it can reach... Better Ferraris, McLarens, or other usual exotica drivers don't come close if they don't want to return home crying humiliated. Numbers don't lie—this GT3 RS TT is mind-bogglingly fast, faster than any



Beetle-shaped car should ever be: right up there with hypercar gods like Veyrons and Koenigsegg. 0-60 time is hardly measurable as such speed is achieved literally the moment you release the clutch. 60-124 mph acceleration time is more telling: It's an unbelievable 4.3 seconds, half a sec faster than a Veyron, even if the 911's driver has a couple of cogs to go through with his manual stick. Speeds on the naughty side of 200 mph are a big event

only for the driver, not the car. If you're wondering what's the maximum speed, so is Karol—he's yet to find a stretch of a road long (and empty) enough to reach the point when his 911 is not building up on velocity.

Peak performance numbers are also not known for similarly abstract reasons—on the dyno the car couldn't find traction up to the sixth gear, where the length of the ratio resulted in speeds above 185 mph, to which these measuring devices in this part of the world are usually limited. The highest values achieved were 800 bhp and well above 740 lb-ft, but they don't tell the full story about the abilities of this car. It turns out that with great dedication, a budget of more than 100,000 USD just for modifications and—above all—proper technical expertise, world-class effects can be achieved no matter which part of the world you're in. Or rather, where a 911 Turbo is. **X**





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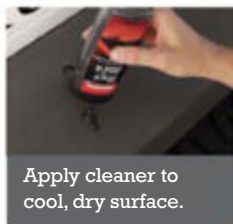


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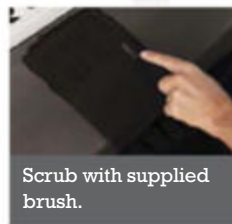
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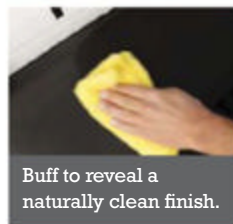
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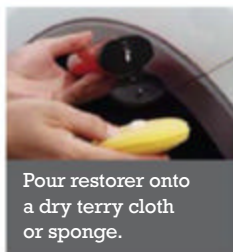


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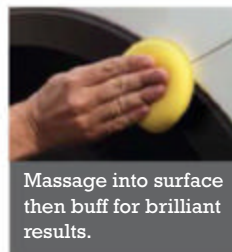


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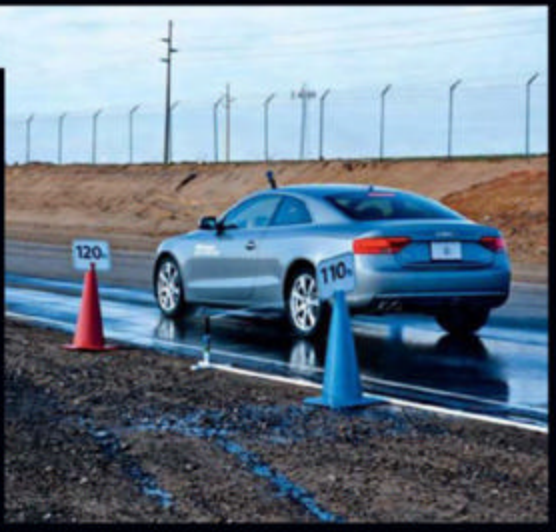
Pour restorer onto a dry terry cloth or sponge.



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ISO 64



**Name a hot topic among car owners** residing in the scorched and desiccated Southwest, and all-weather tires rarely make the top 10. Why, then, did BFGoodrich decide to launch its new all-weather tire, the g-Force Comp-2 All-Season, in Phoenix, Arizona, the Valley of the Sun?

Famous for its extreme climate, golf courses, and UFO sightings, Phoenix enjoys an average yearly rainfall of only 8 inches, interspersed between perhaps 330 days of usually brutal sunshine. However, in ironic contradiction to the region's recent drought, in March I arrived in Phoenix during an honest-to-goodness rainstorm. Well done, BFG.

Compared to the foul weather around the rest of the country, the stuff spitting down from the gray sky was a minor event, but it looked as if my test of BFG's new all-weather tire would take place on the real deal—a wet track courtesy of Mother Nature. Rain never lasts long in the desert, though, and next day's test at Wild Horse Motorsports Park was under clear skies. No problem: A "wet" track awaited, but of the artificially induced variety, constantly misted and sprinkled to fight the fast evaporation. Drought, what drought?

# ALL-WEATHER WORKHORSE

BFGOODRICH G-FORCE COMP-2 A/S **WORDS** LIZETT BOND

Since most of the world has to deal with varying degrees of inclement climate, all-weather tires are a popular compromise between decent performance in the dry and enhanced safety for harsher conditions. "All-weather" tires, however, are offered in a range of capabilities, and the g-Force Comp-2 A/S was designed to increase *performance* in the dry, wet, and even in light snow.

For comparison, BFGoodrich provided a selection of cars fitted with several brands of tires to evaluate and compare, on differing track conditions, braking in the wet and the dry, handling on an autocross course, and ride quality on the open road.

Experts were on hand to talk tires and weather, and I sat down with BFGoodrich product development engineer, Roark Baird, to discuss tire design.

**LB:** A race tire is designed and constructed for specific use, with a variety of compounds to handle a set of extreme track conditions. What is the standard with regards to the design of an all-weather street tire?

**RB:** For the Comp-2 All-Season tire, we utilize a very similar construction to a tire targeted to the performance market. For instance, our g-Force Rival tires feature a "track and back" technology. The construction for our new g-Force Comp-2 A/S is very similar. However, we outfit our all-weather tire with a sculpture and tread compound that will behave well in a wet autocross, for instance. Essentially, you take the strength and construction of a race tire but utilize a compound that's

more attuned to the intended usage.

Basically, what works well in a race-inspired tire, from a handling perspective, is employed using a more streetable sculpture and tread compound. For the all-season tire, the compound, sculpture, and carcass—or foundation—is going to provide the performance and the handling necessary in the cold, snow, and wet. To stick well, and perform well, it's a combination of tread compound and sculpture.

**LB:** The life of a race tire can be as short as 30 minutes, or possibly double- and triple-stinted depending on conditions and tire wear, and then it's changed at the pit stop. A street tire might go tens of thousands of miles and deliver consistent performance. How about an explanation that is consumer friendly?

**RB:** Well, there are multiple factors influencing the life of a tire. Naturally, the type of usage has a lot to do with how long a tire lasts. A tire driven casually will last much longer. A race tire certainly sees much more abuse from stopping, starting, and a lot of horsepower, but these tires also use a very soft compound, as they are shooting for dry performance.

In addition to a supple compound that performs well in the dry, the race tire will have large tread blocks to develop a lot of force in the corners, and when accelerating or decelerating. However, with our all-season tire, one that is going to wear and last a long time, we will use a tread compound that is not as supple, with characteristics that perform well on the cold end of the spectrum.





**"For our consumers, driving is an experience and one they do on the dirt or on the pavement—and our products provide extreme capability and amplify that experience."**

For this reason, we use various tools to make sure that the stresses on the individual ribs in the tires, in the shoulder and in the center, are optimized to provide a smooth and straightforward motion when driving down the road. The tire is optimized to wear uniformly across that contact patch.

For a tire driven daily, you look to a compound that can wear well, ride well in the wet, and perform in the dry. So there are a lot of factors, usage being one, then construction and materials, and optimization of the rubber to the road interface.

**LB:** For years, standard wheel sizes were 13 to 15 inches. That changed in the late '70s to 16 inches, and now wheels are all over the scale. When a car is designed, it is set up for an optimal rim/tire package. Then the aftermarket offers up alternatives, and many cars get combinations that they are not designed for. Is this taken into consideration when a new tire is designed?

**RB:** We optimize a tire to perform well for its size, meaning we are less likely to

try to optimize to a specific car. There are specifications for the size of a tire, and we are federally regulated to meet certain criteria based on the size of a tire, its load index, and speed rating. Those characteristics become the targets for optimization. For example, say a BMW owner wants to upsize a tire diameter, maybe go a few millimeters wider. That owner is more or less getting into a tire that likely has more capacity than needed for that car. The car may only have a load index of 92, but that next size tire is going to carry a heavier load index, meaning more tire than the car needs.

**LB:** As wheel size has increased, sidewall width has decreased. How has sidewall technology evolved?

**RB:** The sidewall is really driven by intended usage. However, as tires become shorter in sidewall, some dimensions are susceptible to "pinch shock," which occurs when a tire rolls over a pothole or a similar situation. So we maintain certain criteria for "pinch shock." In these lower sizes, we certainly don't want customers to install \$800 worth of tires on their new car and then head out on a regular driving occurrence, hit a pothole, and cut a tire. A pinch-shocked tire is damaged forever; it's not going to be fixed. So we have a Bi-Nap, or two-ply, construction, to offset these low-aspect tires. In fact, our Comp2 All Season A/S tire is entirely a two-ply tire line. It's somewhat because of the low aspect, but it's also because, when going after the performance, you want a tire that's responsive and quick turning, with a real positive control feel on the road. The two-plys are much more significant and provide the better performance as well as resistance to "pinch shock." ❌

BFGoodrich Tires at its core is a brand for car enthusiasts, for the driver looking for utmost performance out of his or her daily driver and someone who owns a car that they take out just for fun. For our consumers, driving is an experience and one they do on the dirt or on the pavement—and our products provide extreme capability and amplify that experience, according to Duane Thomas, brand marketing manager at BFGoodrich Tires.

The subject, however, does sometimes edge up the list, usually during a "Storm Watch," that curious frenzy when the populace peers skyward, awaiting that routine but elusive quarter-inch of hammering drizzle. It's no wonder this infrequent phenomenon can transform a perpetually sluggish Southern California freeway system into an apocalyptic nightmare of fender benders and gridlock. Desert climes are just not conducive to wet driving. But as a jaded denizen of the region, I digress. We had two of our editors on hand at the same launch event for driving impressions of the new Comp-2 A/S. Here are some of their observations of the BFG and competitor tires.

**DRY TEST:** Scion FR-S, three models were available, each outfitted with a different tire; BFGoodrich g-Force Comp 2 A/S, Yokohama Avid Envigor, and the budget General G-Max AS 03. Each car was lapped twice around a tight parking lot cones course before switching to the next car. All tire pressures were filled to OE specs, according to BFG.

**Sean Russell:** The BFG returned the most consistent feel and stepped out and pushed the least under hard corner entry/exit compared to the others. Stop feel was very similar to the Yokohama Envigor. Overall, I'd feel safe getting a little heavy footed in the canyon with this all-season sport offering.

**Jofel Tolosa:** The BFG felt a tad faster coming into the slalom section. I was able to hit the medium speed corners with complete confidence. The General tire, on the other hand, had me feeling a bit hesitant to get aggressive with the throttle.

**WET TEST:** Mirroring the dry course, the wet course put us in '15 Ford Mustang V-6 models. Sprinklers kept the surface slick.

**Sean Russell:** Again, the BFG gave the least surprises on a slick surface under a "hard" street drive. Let's just say General makes for a good drift tire. Braking was again comparable to the Envigor.

**Jofel Tolosa:** This is where I noticed the biggest difference between the BFG and the competitors. The Mustang has quite a lot more power than the FR-S, and when I was in the competitor's tires it was clear that I had to wrestle with the car. The BFG were responsive and wheelwork was kept to a minimum.



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WORDS STAFF PHOTOS NICK WILLIAMS

MAKING A MINI FIT  
FOR A **COBRA KING**

# HOT SEAT









**Cobra Seats is a British company** that makes some of the finest furniture in which any driver or passenger has ever had the pleasure of parking his or her tush. So it's only natural that the managing director would run some kind of tricked-out demo car as a daily driver. For Mark Dunsford, it's this eye-popping, super-spec'd R56 Cooper S.

Dunsford is many things: family man, entrepreneur, and the third generation of his family to create car seats. But above all, he's a total gearhead with a genuine passion for BMW in general—and Minis in particular. Which is why he chose this extrovert little number to showcase his company's wares.

"It all started on a trip to our American distributor," Dunsford said. "I tried a track-prepped R53 there and was blown away by the handling, grin factor, and ability. I genuinely had no idea at the time that Minis were so good. When I got back to the U.K., I vowed to get one." He did. That project became Cobra's track car.

What brought Dunsford to this particular 2006 example was simply a case of right color, right wheels, right time. "I wasn't impressed by the R56 when I first saw it," he said. "I felt it lacked some of the design purity of the earlier car. But when this one came up locally on eBay, in great condition and with a set of 17-inch BBS rims, it looked the part. I found it hard to resist." So, for a few hundred less than 7,000 of Her Majesty's British pounds, this custard-colored cruiser was on its way back to Cobra's HQ, for what would be an impressive set of enhancements, centered (unsurprisingly) around a handcrafted Cobra interior.

As Dunsford's design team started preliminary sketches, things were already hotting up mechanically. Having done many favors for industry friends over



the years, word soon spread that the R56 was to get a makeover, and choice parts started arriving from the great and the good of the tuning scene.

Engine mods began with the stylish and sonorous addition of a full Scorpion exhaust system, sensibly featuring a 100-cell sports cat to keep things legal. On the other side of the breathing equation, a Pipercross performance panel filter restores the balance.

Cobra has a long history of working with Forge Motorsport, so it's also not surprising to find many of that tuner's products under the hood—from the updated intercooler, dump valve, and coolant tank to the hoses and strut braces. Each one not only adds a welcome aesthetic improvement but also

future-proofs the powerplant for what was to come. Specifically, a P-Torque re-map to achieve an impressive 250 hp at the flywheel, which makes the drive to work interesting.

As Pirelli once sagely noted, power is nothing without control. So Dunsford and his team sensibly uprated the stoppers to cope with this newfound grunt. A sizable pair of 13-inch discs bitten by four-piston Brembo calipers now sits out front, with a set of John Cooper Works anchors out back. Forge brake lines complete this capable pairing, adding a little extra pedal feel into the bargain.

Wheels are always a tricky choice on a Mini, but Dunsford had a few well-connected friends to help. The car currently wears 8.5x18 Rotiform forged





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monobloc VCEs, but has also worn a set of Team Dynamics Imola rims in the past. In both cases, Yokohama Paradass (215/35) have been used. Keeping the wheels pointing the right way falls to the useful combination of Powerflex bushes throughout, KW Variant 1 coilovers, and a trick set of alignment figures aimed at making the mighty Mini unbeatable on the tight, twisty roads in Cobra's neck of the woods.

Like all good projects, this one has evolved, including three rear spoiler changes. It's now at a point where Dunsford is finally happy. Probably. The aero kit is basically a JCW original, with the GP rear diffuser and Orranje rear spoiler adding some visual punch. The addition of 2013 LED daytime running lights and black roof enhance the car's aggressive appearance. Likewise, the tinted glass and rear lamps. While the car was at the body shop, Dunsford got them to waft a little black over the intake, fuel cap, mirror caps, and door handles as well.

For many people, that would have been a great place to stop. But since Dunsford was creating a rolling catalogue to highlight his company's skills, this was only the beginning. Coming from Cobra, it was inevitable that the interior received the most attention of all. Two custom Misano 30th Anniversary seats were made up, sporting a combination of fine leather and Dinamica fabrics. The rear seats were recovered to match. "This was, understandably, our favorite part of the build," Dunsford said. "We stripped the interior down to a shell and started over. Not everyone realizes that we also offer a bespoke design and trimming service. What better way to demonstrate?" This meant the dash, doors, headlining, plus the A-, B-, and C-pillar trims had to come out to receive the Dinamica fabric. Then it was the turn of the steering wheel, gearshift, and parking brake gaiters before



a set of leather-bound, custom-cut, hand-stitched Cobra mats hit the deck.

At retail prices, enough has been spent in here to fund a reasonable project all by itself, but the result is a cabin that feels more Crewe than Cowley. The final flourish was a full Vibe audio install, complete with flush-mounted amplifier and subwoofer in the trunk, for those times when the Scorpion exhaust's music isn't appropriate.

"I'm so grateful to everyone who has helped us with this car," Dunsford said. "I wanted to build something that reflected what we do at Cobra, something that was the best it could be, and using the

best parts and brands available. Thanks to some very generous people who have helped with their products and time; I think we've done it."

It wasn't only Dunsford who was impressed. Lending the car to a good friend—multiple BTCC champ Matt Neal—for the Team Dynamics stand at the Essen show brought home how easy on the eye the package can be. "We had to laugh about it," Dunsford said. "The Mini was in a hall surrounded by several million pounds' worth of the latest Lamborghinis. And yet the crowd was three-deep around the R56. I think Minis do that. Everyone loves them." ■



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The Infiniti system is made up of the ECU itself, an available plug-and-play sub-harness, and an adapter box that communicates with the cars' CAN bus systems.



# TUNING SOLUTION

PORSCHE 996/997 TURBO ENGINE MANAGEMENT MADE EASIER

Words & Photos Aaron Bonk

**THE ABILITY TO MANIPULATE** the brains behind Porsche's 996 and 997 chassis is about as old as 1999's totally revised 911 itself. Like any automaker that's got to concede to legions of emissions regulations and safety appeasements, both cars' electronic control modules allow room for improvement. That is, if you're the kind of person who thinks more power and better driveability make life better.

Want to turn up the boost pressure and keep the engine's air/fuel ratio happy? There's hardware for that. Not satisfied with the factory rev limit? That and a whole lot more can also be changed. But you already knew that. As it turns out, just about anything can be fiddled with. All you need is access to all sorts of expensive equipment and, until recently, the wherewithal to hack into your computer every time a change has to be made.

We're talking about reflashing, which until not that long ago was about the only thing standing between you, a bone-stock computer, and a complicated, standalone engine management system that typically meant all sorts of sensors would have to be swapped and complex wiring surgery would have to be performed.

Not anymore. And that's partly because of AEM's Infiniti EMS. AEM's famous for its plug-and-play engine management solutions for all sorts of makes and now offers systems for

Porsche's 996 and 997 Turbo models with manual transmissions. The company, which began as the R&D arm of Redline/Weber, later culminated into the maker of all sorts of indispensable tuning wares, like adjustable camshaft gears and intake systems designed to draw fresh air from outside the engine bay. Today, the Hawthorne, California-based company is famous for its electronics.

## INFINITI VS. THE REFLASH

For the guy searching for a moderate power bump on the same car that he schleps back and forth to work, a reflashed ECU makes a whole lot of sense. Most developers offer software upgrades that'll give him exactly what he needs, allow him to pass an emissions test, and never let a Honda Civic with an engine swap come close to embarrassing him. Except that's part of the problem. A reflashed ECU will give him exactly what he needs, today, sure, so long as the mechanical underpinnings of the twin-turbo, 3.6L powerplant he's got aren't switched up too much. Upgrade those turbos, for example, and it's back to the reflash guy for new software.

## SETTING IT UP

AEM's done more than just about anybody to make the process of integrating a

stand-alone engine management system into so many late-model chassis less threatening. Compatibility with every last one of the 996's and 997's applicable sensors is mostly to blame for that along with sub-harnesses that plug directly into, for example, the chassis' wiring harnesses and CAN bus connectors with nary a splice or drip of solder.

Until now, integrating a stand-alone engine management system into the Porsche's CAN bus system meant having to deal with all sorts of seemingly unrelated ancillaries, like dashboard electronics, A/C, power windows, and door locks. Mess up what you thought was wiring that led to an oxygen sensor, for example, and your satellite radio might go out of commission.

The fully sealed Infiniti can be mounted anywhere, but AEM designed the case to fit in the factory ECU's original location. The party starts by removing the rear subwoofer to access the computer and its five connectors, which plug directly into AEM's adapter box that sorts out CAN bus duties. A sub-harness that's sold separately connects the adapter box to the Infiniti, which can be connected to a laptop to load the firmware and available base map. All that's left is to turn over the ignition and drive it or open up the software and start making adjustments.

A 996 Turbo and 997 GT2 Infiniti-equipped pair tucked away at Laguna Niguel, California's Vision Motorsports. The 996 incorporates its original MAF sensor, which allows for VE-based tuning, however, the GT2 is producing upward of 650 whp and now features a speed density-based system.



## WHAT IT DOES

The Infiniti's ability to adjust all sorts of parameters in search of a whole lot more power is comprehensive, but even without so much as a single tap of the keyboard, improvements are there. According to the people at AEM, that's because of the Infiniti's 32-bit, 200-MHz processor and real-time operating system. Laguna Niguel, California's Vision Motorsports helped confirm all of this, performing back-to-back dyno pulls on an '01 996 Turbo with no changes made beyond the addition of the Infiniti and its pre-loaded base map. Here,

nearly 7 whp were uncovered, all before AEM's InfinitiTuner software had even been massaged. But nobody here's interested in parting ways with just south of \$4,900 for a measly 7 whp and without ever delving into the software. That is, after all, what separates systems like the Infiniti from a reflash. Aside from its processing speed, the Infiniti's ability to adjust air/fuel ratios based on the engine's volumetric efficiency on mass airflow-based applications like 996 and 997 chassis is one of its most notable characteristics. As opposed to more conventional injector pulse-width-based tuning

systems where all sorts of variables have to be pinpointed before tuning can even begin, VE-based tuning requires very little information up front beyond the engine's approximate airflow characteristics and what air/fuel ratio you'd like to arrive at. Go ahead and tell the Infiniti the desired air/fuel ratio, and watch it adjust its tables to suggested values that you can either continue to tweak or leave alone. In other words, VE-based tuning tells the fuel injectors what to do instead of you telling the ECU what they're supposed to do. That means tuning's now gotten a whole lot easier for everyone.

Changes can even be tested without subjecting the engine to a dyno pass right away. AEM's InfinitiTuner software's Internal Simulator shows you what's likely to happen once the appropriate information is supplied. For example, if you know how much power you should be making—along with a bit of fuel injector information and a whole lot of experience with your engine—then AEM's simulator has the ability to reveal how the ECU will react.

Unlike some reflashes that don't allow toggling back and forth between different states of tune or stand-alone systems that require a separately wired and mounted ancillary switch to do so, the Infiniti features built-in map switching that, because of AEM's integration with Porsche's CAN bus system, can be selected through the factory cruise control buttons on the fly. Here, eight different states of tune can be selected right from the steering wheel, allowing for dramatic changes in engine performance, octane type, and more, depending on the circumstances and any previous tunes that may've been saved. Mode changes are confirmed at the tachometer where the needle briefly indicates, in increments of rpm, which tune has been selected. For example, a quick flip of the needle to 2,000 rpm means mode two has been chosen.

The Infiniti includes all sorts of ways to extract an engine's full potential, but it also includes all sorts of ways of getting that done without blowing anything to smithereens. Its built-in knock-sensing capabilities are part of that. Here, the engine's original sensors are retained, however, what happens once pre-ignition is detected is entirely up to you. Decrease boost pressure or ignition timing, add fuel, or make just about any other change you see fit should detonation begin to rear its ugly mug. Other fail-safes include over-boost and lean full supply protection and, with the appropriate sensors from AEM that communicate with the ECU through the provided expansion port, oil pressure, coolant temperature, and fuel pressure protection. Set up the parameters and, if trouble happens, the Infiniti will immediately adjust the fuel supply, limit engine speed, or cut ignition timing, depending on what exactly is going on.



AEM enclosed its plug-and-play applications in chassis-specific enclosures that mount in the factory ECU's original location.



Speed-density-based systems that do away with the factory MAF sensor are often employed when searching for significant power gains. Here, the GT2's turbos have been upgraded for larger units and the bottom end is made up of forged internals. AEM's Infiniti is suited for higher-end applications like this as well as entry-level engine programs that retain many of the stock components, if not all of them.



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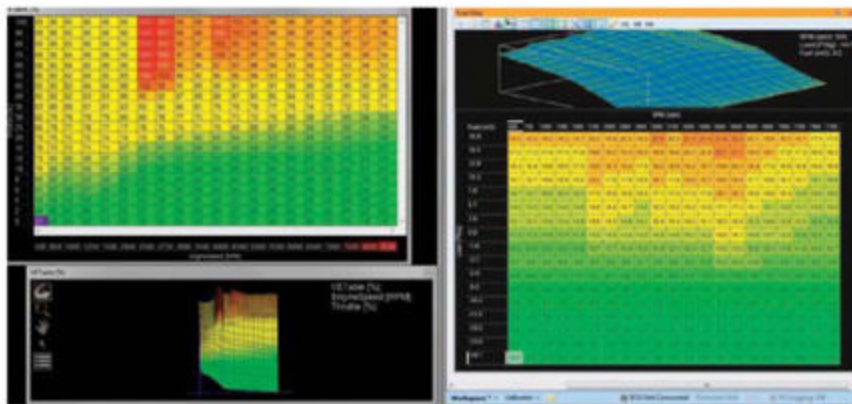


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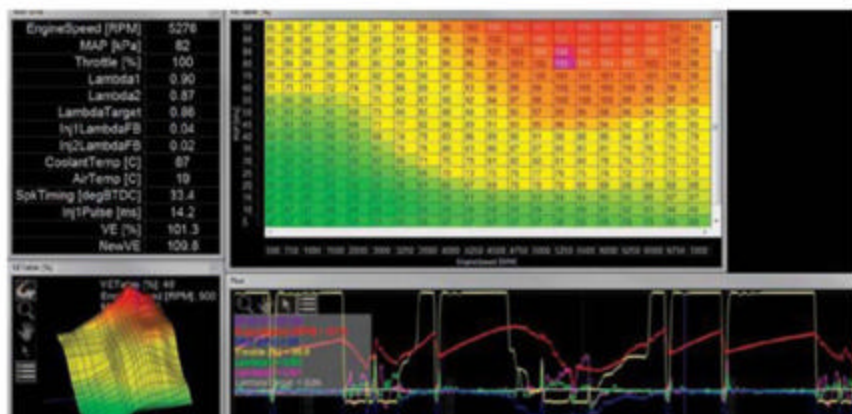


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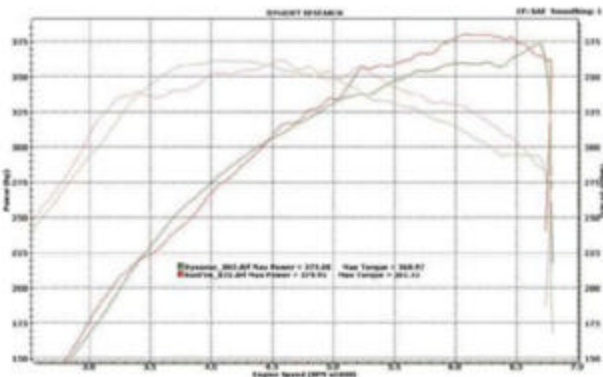




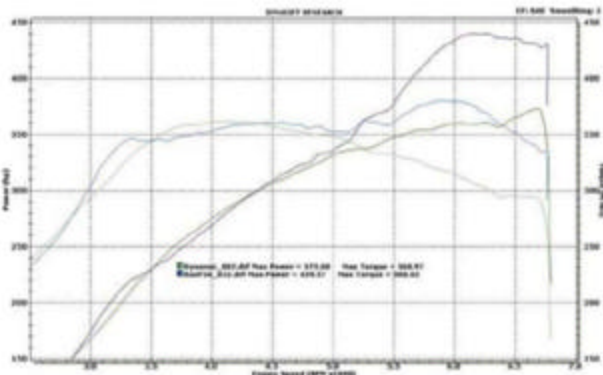
AEM's Infiniti software includes VE-based tuning tables (left) that decrease set-up time and make changes as easy as setting a target air/fuel ratio and watching what happens. Most other systems are based off of slightly more complex injector pulse-width characteristics (right).



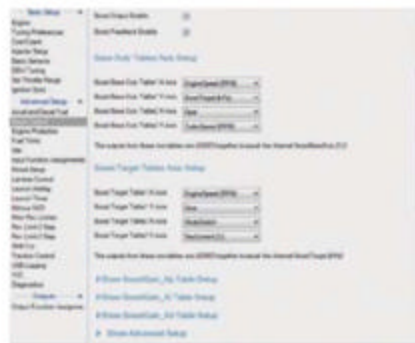
All sorts of information can be logged directly to a laptop, which can speed up tuning time and reveal exactly what's going on at any given point.



Expect small gains even with AEM's start-up base map. The Infiniti's ultra-fast, 32-bit, 200-MHz processor and real-time operating system mean operations happen quickly, resulting in gains like these, especially when compared to other slower stand-alone engine management systems.



A few minutes later and a little more boost is all it takes to safely generate another 60 whp.



All of the engine's sensors and parameters can be easily set up or modified through the InfinitiTuner software's setup menus.

But melted pistons and broken ring lands will never be as glamorous as complete VarioCam Plus control, built-in traction control, and the ability to calibrate drive-by-wire throttle controls to behave however you'd like. Which is exactly what the Infiniti's capable of. Here, the ECU monitors wheel speed using existing ABS sensors and, depending on the rate of speed from one wheel to the next, adjusts power accordingly by limiting ignition timing, fuel, or throttle angle. Turn it on or off, again, using the factory cruise control buttons. AEM's drive-by-wire controls are just as impressive, allowing complete behavior control from pedal to throttle—something your average reflash isn't capable of. Adjust the throttle curve and response rate however you'd like and, for endurance racers, for example, limiting power based upon throttle movement is easy and safe.

## WHAT YOU GET

Buying AEM's Infiniti now means not paying for a whole bunch of add-ons later. The system includes built-in wideband oxygen sensor controllers that you would've needed anyway for fine tuning, data-logging capabilities that mean you won't need a recordable dash, as well as boost control and traction control capabilities that eliminate at least two other bits of hardware you already wanted. All of a sudden, the Infiniti seems affordable, especially when considering some of the other stand-alone systems often used on the 996 and 997. It's also compatible with both chassis' MAF sensors and electronic bypass valves as well as the 996's boost solenoid, and is fully compatible with the 997's variable-geometry turbos.

The ability to fine-tune Porsche's 996 and 997 chassis' electrical hardware for better performance is nothing new. But the way in which all of that can be done has been forever changed. **X**

## SOURCES

Advanced Engine Management  
[aemelectronics.com](http://aemelectronics.com)

Vision Motorsports  
[visionmotorsports.com](http://visionmotorsports.com)



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WORDS AND PHOTOS MATT ZUCHOWSK

# PASSION AND PRAGMATISM

CATCHING UP WITH HARALD WESTER—MASERATI AND ALFA ROMEO'S CEO

**A little known fact:** Two of the greatest automotive symbols of Italy are managed by the calm and analytical industry veteran Harald Wester. By giving some German *Ordnung* to these romantic brands, he aims to restore their former glory—a thing we have waited too long to come.

**What does Maserati mean to you, and what are your ambitions for the future?**

I'm not with Maserati to change any of its aims. Maserati is the symbol of Italian style, involving performance and elegance. No one wants to change that. We only want to bring these values to our cars more effectively.

**Nevertheless, Maserati is undergoing a huge transformation right now. Since 2013, we have seen premieres of two**

**completely new models—Quattroporte and Ghibli—and before long, an SUV. You're also working to reinvigorate the second brand you represent: Alfa Romeo. To what extent will the development of Maseratis and Alfas be integrated?**

My role at Maserati is different from that in the Alfa Romeo as the latter is better integrated into the Fiat group. My job there as global brand leader is to oversee the technical development of the new cars, the first of which will be presented this June, along with the completely renewed Alfa Romeo Museum in Arese, Italy. But the new Alfa car won't share any parts with the current Maserati model. I'm not planning any technical merging of these two makes.

**Do you see any chance of repositioning either Maserati or Alfa Romeo within**

**the Fiat group, now that the brands will have totally new model lineups with different types of products?**

When we think of the Fiat group, we need to take into consideration that only 10 years ago, our position was fundamentally different from what we have today. We didn't have money, though we had a decent status in Europe, but a weak one in the USA and Asia. Today, thanks to the Chrysler group, the situation is exactly the opposite in each of these cases.

What we have seen in Europe is the problems of factory overcapacities, price wars, and extreme competition overall. Nobody makes money selling compact cars now, which used to be the core business of the Fiat Group. Everybody in that segment has lost huge cash, Fiat included. It is fully justified then to invest money in a completely new range of global products, which will also be profitable



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**"It's not enough to develop beautiful cars, you also need to be capable to produce and sell them globally."**

in Europe. Thanks to this, Maserati, Alfa Romeo, and Jeep have come to be strategically important to the whole Fiat Group. Their success will bring us two things: First of all, we will bring back the workers who were laid off in Italy; also we'll have totally different products in different segments, with hopefully significant profit margins.

In 2012, Maserati was making around 6,000 cars a year. The first goal is to surpass 50,000 cars annually. How is that progressing and what's the future goal? That was just an intermediate step in our journey to have six models and the global sales of 70,000 in 2018. Our goals currently depend on the availability of the third model, the SUV, which we presented in 2011. Since that first outing, everything in it has been shuffled: We have moved the production from the U.S. to Italy, where it will start early next year.

Our current forecast is that our sales volumes, which were 36,500 last year, will remain flat this year. And when we have the Levante SUV, we'll achieve the next sales level.

**Are you tempted to go beyond the 70,000 level afterward, transforming Maserati into one of the biggest premium players of the car industry?**

No. Maserati is not and won't be BMW or Mercedes-Benz. We are part of a group that has 14 brands, so each of them has limited market space. For example, Maserati can't make an SUV of the Audi Q5 size—this is the job of Alfa Romeo and Jeep. Maserati will remain where it is—even after adding the Levante to the lineup. Seeing one on the street will be an event.

**What is the advantage of Maserati over the American or German premium brands other than greater exclusivity of the products?**

They evoke emotions! It is much more of a kind of a car that arouses a feeling that you're really driving the car. You're an integral part of the system, you're in

control. In many other cars, you have more of a feeling that you are driven. You can even see this if you compare the slogans when some of the other brands are claiming their advantage through technology.

**But some of the trends are impossible to avoid. Is there any room for hybrid drivetrains at Maserati?**

It is a technology that is well known to us, and I deem it unavoidable to utilize it. For various reasons, it will become very important in the next five to ten years. In the segments where Ghibli, Quattroporte, and Levante do or will operate, it is forecast that hybrids will make 40 to 50 percent of the global sales. We are working on a plug-in hybrid system and will start to offer it in the second half of 2017 starting with Levante and then moving to the other cars. Our plug-in hybrids aim to cover 20 to 30 miles driven solely by the electric motor.

**What is your personal view on this trend?**

Look at the numbers. Based on CO<sub>2</sub> emissions, we are claiming that 2-ton SUVs have a smaller environmental impact than a basic city car. In many countries, it's the owner of the latter who will pay higher road taxes, and in some places, the drivers of these big monsters will even be exempted from paying. All that comes from a fact that we assume that electric energy coming from plugs doesn't create CO<sub>2</sub>, which is not true. Hybrids don't save the world, but for the time being, the rules are what they are.

**Let's do a quick round of yes or no questions. Do you see any room for a sports car positioned above Alfieri?**  
Yes.

**Do you see any room for a Ghibli station wagon?**

No. It's a niche, unsellable in regions other than Europe.

**How about extended wheelbase Ghiblis or Quattroportes?**

No, the cars are big enough as they are.

**One-offs with bodies built by coach-builders like Touring or Zagato?**

Potentially, yes.

**Motorsport activities?**

No. The only thing of that type we're doing now is the Maserati Trofeo racing series for our customers, but it doesn't have any marketing effect. The only motorsports with a global impact are Formula 1 and four or five of the 24-hour races. The rest may be interesting for enthusiasts, but it doesn't really have any benefit for the business. ■





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# COUNTDOWN TO RENNSPORT V

ROTHMANS PORSCHE 956/962 WORDS KERRY MORSE PHOTOS BRUCE BENEDICT

**Porsche enthusiasts are counting off** the days until September 25-27, when the fifth edition of Porsche Rennsport starts at Laguna Seca Raceway on the Monterey Peninsula. In tribute to this very special gathering, *ec* is focusing in on a special Porsche in each issue leading up to the event.

The 956 and 962, based on their long and competitive history, may well be the most successful top-line sports prototype ever constructed. It was 33 years ago that the first works Rothmans 956 debuted at Silverstone for the inaugural race of the FIA's new Group C class. The most coveted examples are the factory team cars: Only 10 956s and 10 962C models were built at Weissach. So what was it that made the 956 and 962 so good that even a basic amateur team could campaign the car in Group C and IMSA and post decent results? For the answer, who better to call than the man called the "father" of the 956/962, famed engineer Norbert Singer.

**"To have a successful car in endurance racing, you need to have first a very reliable car. This was one of the main points when we started with the 956."**

"To have a successful car in endurance racing, you need to have first a very reliable car. This was one of the main points when we started with the 956. This car had a lot of different and complete new components. The engine was the only part which was proven and tested; it won Le Mans in 1981. The rest of the car was

completely new—gearbox, suspension, and, for the first time in Porsche history, an aluminum monocoque, which had right from the beginning an outstanding stiffness-to-weight ratio. Also new were the composite materials for the bodywork. All this was developed and built in nine months! Also important was that


all the development and parts manufacturing was done in-house, in Weissach, starting from the monocoque to engine and gearbox down to suspension and rim design as well as bodywork, especially the underfloor with its very specific needs for the ground-effects forces.

Second, you had to have the performance to race, and you should have the possibility to beat the others. In that point, we had very good aerodynamics. We were able to use the ground effects very efficiently. I think this was one of the main keys to be so successful through all the years.

Third, the engine was over the years also very efficient in fuel consumption versus power output, which was a key factor of the new Group C regulation.

Not to forget the perfect support from the tire side with Dunlop. They supplied us not only with tires with good and constant grip, they also made new tire sizes on your requirements; for example, in 1985, we asked for a narrower but taller rear tire to get better aero with wider ground-effects ducts.

That car, which was in principle the same through all the years, aside from detail works, took the others six and more years.

Not to forget the whole team, which was not only very excited to do the work, but was also very creative and was only a fraction of the number of people that is today necessary to be successful." 



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# Lotus Elise ('05-'11)

THE LIGHT FANTASTIC

Words Colin Ryan

**In the future**, when the masses are in autonomous cars and have over-developed thumbs to go with their under-developed driving chops, people who own a Lotus Elise are going to feel pretty pleased with themselves. They will guard a secret knowledge.

Few cars are so visceral, so plugged in to the road and the physical world in general. Power steering, automatic transmission, sound deadening... who needs them? Just a small steering wheel, a neat little instrument cluster, engine at the back of your neck, nether regions close to the ground, rear-wheel drive and super-light weight (a tad under 2,000 pounds)—that's the recipe for real driving. Double wishbones at both ends and an antiroll bar at the front give a ride that balances agility with precision, along with some relative degree of comfort. The seats are thin, but they're well-shaped and supportive.

Americans weren't allowed the joys of Elise ownership until 2005, when the Series II came over. The Series I launched in Britain in 1996; the Series II in 2001. The Feds eventually let in the Series II because it now had a Toyota-sourced, all-aluminum, 1.8L four-cylinder engine (the 2ZZ-FE, also found in the Celica). This was much cleaner than the previous generation's British Leyland/MG motor, and no doubt more reliable as well.

The ECU was tuned by Lotus to bring 190 hp at 7,800 rpm and 133 lb-ft of torque at 6,800 rpm. The intake and exhaust are also Lotus parts. If those numbers don't sound particularly impressive by themselves, remember the Elise is one of the lightest cars around—and one of the most nimble.

The most interesting bundle of extras is the Track pack, adding adjustable Bilstein shocks with remote reservoirs, five-way adjustable antiroll bar, reinforced rear suspension, a Petty bar, and mounts for racing harnesses. The options of a limited-slip differential and traction control came in 2006. In 2008, a supercharged version, the rear-spoilered SC, debuted with 218 hp at 7,800 rpm and 153 lb-ft of torque at 5,500 rpm, enabling a zero-to-60-mph time of 4.4 seconds. In all cases, the transmission is a six-speed manual.

A California Edition also arrived in 2008, with a silver grille mesh, color-coded side vents, large rear spoiler, 16-spoke alloy wheels, and leather seating; Lotus made 50 examples. The '11 model year brought a mild face-lift.

Unfortunately, buying a used Elise is trickier than with most other cars. They're enthusiast machines, and sometimes enthusiasm overcomes driving abilities, so pay special attention to crashed-and-repaired examples. The Elise has a fiberglass body over a lightweight aluminum-and-steel frame where much of the pieces are not welded but glued together.





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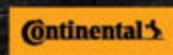
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## TECH SPEC '05-'11 LOTUS ELISE

### LAYOUT

Transverse mid-engine, rear-wheel drive

### ENGINE

1.8L, DOHC, 16-valve, I4

### TRANSMISSION

Six-speed manual

### SUSPENSION

Double wishbones, coil springs, antiroll bar (f); double wishbones, coil springs (r)

### PERFORMANCE

#### PEAK POWER

190 hp @ 7,800 rpm (base), 218 hp @ 7,800 rpm (SC)

#### PEAK TORQUE

133 lb-ft @ 6,800 rpm (base), 153 lb-ft @ 5,500 rpm 0-60 mph: 4.8 sec. (base), 4.4 sec. (SC)

#### TOP SPEED

148 mph (base), 150 mph (SC)

Getting fiberglass fixed is one thing, but if the frame has been knocked out of shape even by as little as a couple of millimeters, don't bother with it. There is a front crash structure that's meant to absorb the energy, but getting it replaced is a pricey project.

It might be tempting to pick up a salvage car for a song, but even then a front or rear fiberglass clam-shell could still cost \$3,000 just for the unpainted part. Stress cracks that look like spider webs are signs of damage to the fiberglass beneath the paint finish.

Obviously, no need to worry about corrosion with one that's been written off because of flooding, but the electrics would have suffered, and everyone knows how frustrating, time-consuming, and expensive it can be trying to isolate an electrical problem. Overall, it would be ideal to get a car that's just been used as a weekend runabout.

There is the fixed-roof sibling, the Exige, which is also wonderful, but we'll stick with the convertible Elise here. The fabric roof, incidentally, is a rigmarole

of stretched fabric, side rails, and bars—the kind of thing that could cause anxiety in a sudden rainstorm. Make sure all the parts are present, correct, and in decent condition.

Because the Elise is so light, it doesn't usually work the brakes (two-piston AP Racing calipers at the front, single-piston Brembo calipers at the rear) and tires too hard. But some cars will have seen track time, so be just as diligent with these parts as everything else.


One area where track work will take its toll is the rear toe-link, which might fail due to a design flaw (not a problem with Track pack cars). Check the steering; there should be no play whatsoever. And there should be no slippage of the clutch.

In later years, the bushing of the throttle pedal has been known to fail. Replacing it is fiddly. Another design flaw in the headlights of '05 cars magnifies sunlight and could melt the inner section (rarely a problem in Britain). Replacing them with more modern units is easy enough.

The Elise has a virtually smooth aerodynamic tray that covers most of the car's underside. Over-tightened bolts may strip and cause this component to rattle.

Some owners have experienced sudden jumps in coolant temperature. Routine maintenance of the system will help in most cases, but if the problem persists it's time to call in an expert.

The National Highway Traffic Safety Administration (NHTSA) recalled just over 5,000 '05 and '06 cars because oil cooler lines might become disconnected and create a fire hazard.

The Elise is considered too low volume for Kelley Blue Book values. A look at the classifieds brought a range of prices from \$23,500 (2005, with only 31,600 miles on the odometer) to \$54,985 (2011/1,600 miles). An '08 SC with 15,000 miles was selling for \$47,950. We also found an '09 California Edition with 4,000 miles priced at \$50,000. As always, keep a cool head, get a specialist to look over any contenders, and history, history, history. 







***TSW***

The new Bathurst RF wheel, shown above with the Silver - Mirror Cut Face finish is available in 17, 18, 19, 20 and 21 inch staggered fitments. The Bathurst RF features a brilliant starburst of ten ultra narrow beveled spokes that is as visually light as its actual weight. The Bathurst RF is manufactured using a highly advanced production technique called Rotary Forging. The rim of the wheels is forged at high pressure while the wheel is spun at high speed. This alters the molecular structure and enhances the strength of the alloy. The benefit is a much lighter weight than a regular cast wheel. Most importantly, the weight saving is in the outer rim of the wheel which dramatically reduces rotational mass and enhances vehicle performance. Visit our website for more details and to view the complete line of one-piece, multi-piece and Rotary Forged® wheels.





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